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# **Entiat Valley 115 kV Transmission Program**

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# **Environmental Assessment**

**June 2008**



**USDA Forest Service  
Okanogan and Wenatchee  
National Forests**



**USDI Bureau of Land Management  
Spokane District**



**Public Utility District No. 1  
of Chelan County**

# **Environmental Assessment**

## **Entiat Valley 115 kV Transmission Program**

June 2008

United States Department of Agriculture, Forest Service,  
Okanogan and Wenatchee National Forest  
Entiat Ranger District

United States Department of the Interior, Bureau of Land Management  
Spokane District Office, Wenatchee Field Office

Public Utility District No. 1 of Chelan County  
Chelan County, Washington

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## ACRONYMS

AC	Commercial Agricultural Land (Chelan County Zoning)
APE	Area of Potential Effect (Cultural Resources)
BLM	Bureau of Land Management
BMP	Best Management Practice
BMU	Bear Management Unit
BPA	Bonneville Power Administration
CCD	Census County Division
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DAHP	Washington State Department of Archaeology and Historic Preservation
dB	decibel
dBA	A-weighted decibel
dbh	diameter at breast height
District	Public Utility District No. 1 of Chelan County
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EDNA	Environmental Designation for Noise Abatement
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EMF	Electric and Magnetic Field
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FLPMA	Federal Land Policy Management Act
Focus Group	Entiat Valley Electrical Upgrade Focus Group
Forest Plan	Wenatchee National Forest Land and Resource Management Plan
FR	Forest Road
G	Gauss
GMU	Game Management Unit
HDR	HDR Engineering
Highway 97A	State Highway 97 Alternate
Hz	hertz
ID Team	Interdisciplinary Team
kV	kilovolt
kV/m	kilovolts per meter
LAU	Lynx Analysis Unit
mG	milligauss
MIS	Management Indicator Species
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFP	National Fire Plan
NFS	National Forest System
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
NOAA	National Oceanic and Atmospheric Administration
NPCC	Northwest Power and Conservation Council
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWCB	Noxious Weed Control Board

NWFP	Northwest Forest Plan
NWI	National Wetlands Inventory
OFM	Washington State Office of Financial Management
OHV	Off-Highway Vehicle
PFA	post-fledging family area
PHS	Priority Habitats and Species
RCW	Revised Code of Washington
RM	River Mile; or, Roaded Modified
ROS	Recreation Opportunity Spectrum
ROW	right-of-way
RR	Rural Residential/Resource Areas (Chelan County Zoning)
SEPA	State Environmental Policy Act
SPCC	Spill Prevention, Control, and Countermeasures
SPNM	Semi-Primitive Non-Modified (ROS Setting)
SWPP	Stormwater Pollution Prevention
TCP	Traditional Cultural Property
U	Urban (ROS Setting)
UGA	Urban Growth Area (Chelan County Zoning)
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VAP	Visual Assessment Point
VQO	Visual Quality Objective
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WDOT	Washington Department of Transportation
WNHP	Washington Natural Heritage Program

# **1. PURPOSE AND NEED**

## **1.1 INTRODUCTION**

The Public Utility District No. 1 of Chelan County, Washington (District) has applied to the U.S. Department of Agriculture (USDA) Forest Service and U.S. Department of the Interior (USDI) Bureau of Land Management (BLM), respectively, for a special use permit and a right-of-way (ROW) grant to build a new 115 kilovolt (kV) electric transmission line in the Entiat, Washington area that would cross lands managed by these agencies. The USDA Forest Service and BLM are required to conduct an environmental analysis of this proposal under the National Environmental Policy Act (NEPA). Environmental analysis is also required under the Washington State Environmental Policy Act (SEPA) for activities on state and private lands. The transmission line would cross state lands managed by the Washington Department of Natural Resources (WDNR) and Washington Department of Fish and Wildlife (WDFW).

The District is the lead agency for the SEPA analysis. The USDA Forest Service is the lead agency for the NEPA analysis. This Draft Environmental Assessment (EA) has been jointly prepared for the Entiat 115 kV Transmission Program by the two lead agencies. The EA documents the environmental analysis of the proposed action and alternatives in accordance with both NEPA and SEPA and is intended to satisfy the requirements of both statutes, pursuant to 40 Code of Federal Regulations (CFR) 1506.2 and Washington Administrative Code (WAC) 197-11-610.

The EA is designed to:

- Provide the decision makers with the information needed to make a fully informed decision on the Entiat 115 kV Transmission Program based on the available information relevant to the proposal.
- Inform the public about the proposed action and the alternatives to the proposed action.
- Document the process used to analyze the proposed action and alternatives, the environmental effects of those actions, and the mitigation measures proposed for each option.
- Disclose the direct, indirect, and cumulative environmental effects of the proposed action and alternatives.
- Indicate any irreversible or irretrievable commitment of resources that would result from each alternative considered.
- Consider short-term use versus long-term productivity.
- Identify mitigation measures that would address potential environmental effects identified through this analysis.

This EA follows the general format established by the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR Parts 1500-1508), as well as meeting the requirements established under SEPA (WAC 197-11).

## **1.2 BACKGROUND**

In 2005, the District formed the Entiat Valley Electrical Upgrade Focus Group (Focus Group), which consists of local residents and Federal and state agency representatives, to assist in the development and review of potential options to improve electrical service to the Entiat Valley in Chelan County, Washington (Figure 1-1). In the fall of that year, the District and Focus Group identified nine route options, including No Action. The District commissioned a feasibility study to explore these options and solutions from an engineering and constructability perspective. These options and the findings of the feasibility study were reviewed and discussed in Focus Group meetings. Based on this collaborative

process the District and Focus Group narrowed the options to the proposed action, which was presented to the USDA Forest Service and BLM in the form of special use permit and ROW applications, respectively. The USDA Forest Service and BLM have accepted this proposal as their proposed action for Federal lands along this route.

As noted above, the EA is a joint NEPA/SEPA document, with the USDA Forest Service serving as the NEPA lead agency and the District serving as the SEPA lead agency. The USDA Forest Service is a joint lead agency because the proposed action involves constructing a new transmission line across 2.6 miles of the Wenatchee National Forest. The BLM is a cooperating agency under NEPA because the proposed action would also cross approximately 0.4 mile of lands managed by the BLM.

The proposed action would also cross state lands managed by the WDNR (1 mile) and WDFW (0.9 mile) and, as a result, WDNR and WDFW are cooperating agencies under SEPA. The proposed action would also cross 0.9 mile of private land.

### **1.3 PURPOSE AND NEED**

The District is a non-profit Washington public utility district organized, existing, and operating under and by virtue of Chapter 54 Revised Code of Washington, and is located in Wenatchee, north central Washington State. Its mission is to provide cost-effective, reliable electrical service to those within its defined boundaries, and to plan for the future electrical service needs of its constituency. The District is responsible for providing electrical service to approximately 940 customers in Entiat and the Entiat Valley in Chelan County, as well as other communities within its service area. The Entiat Valley is currently served by a single 34.5 kV transmission line constructed in 1940 that is sourced from the Entiat City Substation and follows the valley floor. The District's 2004 to 2023 long-range plan identified a capacity deficiency in the Entiat service area based on projected electrical demand in the valley and the effects of this demand on the existing infrastructure serving the area (District 2003). This deficiency is now apparent with the Entiat system experiencing brownouts and other outages due to the loads on the system under certain conditions. Also, under the current transmission system configuration, a failure at or above the Entiat City Substation would affect all up valley customers.

The District has identified a need to correct this deficiency and provide reliable electricity to its customers in the Entiat service area without substantially interrupting existing service to Entiat Valley customers.

The District has applied to the USDA Forest Service and BLM, respectively, for a special use permit and a ROW grant to construct the transmission line across Federal lands. The Federal agencies have a need to respond to the District's applications to provide this public service. The District has also applied to WDNR and is in the process of applying to WDFW for easements to construct the transmission line across state-managed lands.

### **1.4 PROPOSED ACTION**

The proposed action would be undertaken by the District and involves construction of approximately 5.8 miles of new 115 kV electric transmission line from a new switchyard that would be constructed near Earthquake Point to a new substation that would be located in the Entiat Valley, just north of Crum Canyon. Three temporary work areas would be needed for materials and equipment staging during construction (each area would be approximately 200 feet by 200 feet).

The proposed transmission line would parallel the south side of the existing Bonneville Power Administration (BPA) 345 kV and 500 kV transmission line corridor for the majority of its length. The proposed line would cross public lands managed by the USDA Forest Service (2.6 miles), BLM (0.4 mile), WDNR (1 mile), and WDFW (0.9 mile). The remainder of the line (0.9 mile) would cross private

lands. The proposed action is located within Township 25 North (T25N), Range 19 East (R19E): Sections 28, 33; and T25N, R20E: Sections 25, 26, 27, 30, 34, 35, 36, 31, 32, 33 (Figure 1-2).

If approved, construction of the proposed transmission line would take place in 2009. The substation would be built in 2010 and the transmission line would be energized at this time through an interim (“shoo-fly”) connection at the switchyard location. The switchyard is proposed to be constructed in 2011. This schedule is also dependent on the District’s budget and budgetary approval. The proposed action and alternatives are described in more detail in Chapter 2.

## **1.5 DECISIONS TO BE MADE**

The District has identified an electric capacity deficiency in the Entiat service area with the system experiencing brownouts and other outages due to the loads on the system under certain conditions. Consistent with its mission to provide cost-effective, reliable electrical power to customers within its service area, the District must decide whether or not to construct a new transmission line, switchyard, and substation to resolve this deficiency while properly addressing environmental impacts and considering other factors such as private property rights and public safety. In addition, serving as lead state agency under SEPA, the District must decide whether or not to permit construction if the proposed action alternative is selected.

The responsible official for the USDA Forest Service, serving as lead Federal agency under NEPA, must decide whether or not to issue a special use permit to allow the District to construct the proposed transmission line across National Forest System (NFS) lands.

The responsible official for the BLM must decide whether or not to issue a new ROW grant that would allow the District to construct the proposed transmission line across the Federal lands it manages, and WDNR and WDFW must decide whether or not to issue easements that would allow the proposed transmission line to cross the lands they manage.

## **1.6 PLANNING FRAMEWORK**

### **1.6.1 Applicable Laws and Executive Orders**

The following laws and executive orders, with implementing regulations as appropriate, apply to the analysis and implementation of the Entiat 115 KV Transmission Program.

#### **Multiple-Use Sustained Yield Act of 1960**

This Act requires the USDA Forest Service to manage NFS lands for multiple uses (including timber, recreation, fish and wildlife, range, and watershed). All renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be re-established and grown again, if the productivity of the land has not been impaired.

#### **National Historic Preservation Act of 1966 (as amended)**

This Act requires Federal agencies to consult with American Indian Tribes, state, and local groups before nonrenewable heritage resources, such as archaeological and historic structures, are damaged or destroyed. Section 106 of this Act requires Federal agencies to consider the effects project proposals may have on cultural resources in the analysis area.

#### **National Environmental Policy Act of 1969 (as amended)**

The CEQ implementing regulations at 40 CFR Parts 1500-1508 and USDA Forest Service implementing policy and procedures issued in Forest Service Manual 1950 and Forest Service Handbook 1909.15 establish the basic process for conducting and documenting environmental analyses, including public

participation. NEPA requires that the site-specific impacts of the Entiat 115 kV Transmission Program be evaluated prior to the decision to issue a Special Use Permit for NFS lands and a ROW grant for BLM lands that would be crossed by the Proposed Action.

### **Washington State Environmental Policy Act of 1971 (as amended)**

Modeled after NEPA, this law requires all state and local governments within Washington State to ensure that environmental amenities and values will be given appropriate consideration in decision making along with economic and technical considerations. The SEPA Rules are contained within WAC 197-11. SEPA requires that the District and other affected state and local governments evaluate the site-specific impacts of the Entiat 115 kV Transmission Program prior to the decision to authorize construction and issue easements to cross State-managed lands.

### **Endangered Species Act of 1973 (as amended)**

This Act requires the USDA Forest Service to manage for the recovery of endangered and threatened species and the ecosystems on which they depend. Implementing regulations are found in 50 CFR Part 402. The policy and process for Forest Service compliance with the Endangered Species Act (ESA) are found in Forest Service Manual 2670.31. Section 7 of the ESA requires consultation with the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration (NOAA) Fisheries on Federal projects that may affect listed species.

### **The Magnuson–Stevens Fishery Conservation and Management Act of 1976 (as amended)**

This Act requires coordination and consultation with NOAA Fisheries for projects that are authorized, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH). EFH for Pacific salmon species includes streams, lakes, ponds, wetlands, and other currently viable water bodies and most of the habitat historically accessible to salmon.

### **Forest and Rangeland Renewable Resources Planning Act of 1974 (as amended) and National Forest Management Act of 1976 (as amended)**

The Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976, as amended (16 U.S. Code [USC] 1600 et seq.) and the National Forest Management Act of 1976 (NFMA) requires each NFS unit to have a land and resource management plan. Section 6(i) of NFMA (16 USC 1604[i]) requires that resource plans for the use of NFS lands must be consistent with the Forest Land and Resource Management Plan for the NFS unit on which that use occurs. Sections range from required reporting that the Secretary must submit annually to Congress, to preparation requirements for timber sale contracts. There are several important sections within the Act, including Section 1 (purpose and principles), Section 19 (fish and wildlife resources), Section 23 (water and soil resources), and Section 27 (management requirements). NFMA requirements are carried out through implementation of the Forest Land and Resource Management Plans. This analysis is guided by the Forest Plan.

### **Federal Land Policy Management Act of 1976 (as amended)**

The Federal Land Policy Management Act of 1976 (as amended) (FLPMA), also known as the BLM Organic Act, consolidated and identified BLM's management responsibilities, and established multiple use, sustained yield, and environmental protection as the guiding principles for public land management. The act also requires that land use plans be developed, maintained, and, when appropriate, revised. FLPMA also includes the authority for BLM and the USDA Forest Service to grant, issue, and renew rights-of-way across BLM or NFS lands.

### **Wild and Scenic Rivers Act of 1968 (as amended)**

The Wild and Scenic Rivers Act, as amended, was enacted by Congress to provide Federal protection for selected free-flowing rivers within the United States that possess exceptional natural, cultural, scenic or recreation resources. Rivers or river segments that are designated or recommended under this Act are to be managed in such a manner as to protect their outstandingly remarkable values. The level of protection varies by the classification level (Wild, Scenic, or Recreational) of the river or river segment. There are no Wild and Scenic Rivers within the project area. The 1990 Wenatchee Forest Plan identified nine river segments to be recommended to Congress as candidates for inclusion in the Wild and Scenic Rivers system. None of these segments are within the project area.

### **Clean Water Act of 1977 and 1982 (as amended)**

This Act places primary responsibility for protecting water quality with the states. Section 313 of the Act (33 USC 1323) requires Federal agencies to comply with all substantive and procedural state water quality requirements to the same extent as a non-governmental entity. This Act establishes a nondegradation policy for all Federally proposed projects.

### **Clean Air Act, as amended in 1990**

The purposes of this Act are “to protect and enhance the quality of the Nation’s air resources so as to promote the public health and welfare of the productive capacity of its population; to initiate and accelerate a national research and development program to achieve the prevention and control of air pollution; to provide technical and financial assistance to state and local governments in connection with the development and execution of their air pollution prevention and control programs; and to encourage and assist the development and operation of regional air pollution prevention and control programs.”

### **Executive Order 13186 (migratory birds)**

This executive order requires the “environmental analysis of Federal actions, required by NEPA or other established environmental review processes, evaluates the effects of actions and agency plans on migratory birds, with particular emphasis on species of concern.”

### **Executive Order 13112 (invasive species)**

This 1999 order requires Federal agencies whose actions may effect the status of invasive species to identify those actions and within budgetary limits, “(i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species... (iii) monitor invasive species populations... (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded;...(vi) promote public education on invasive species... and (3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction of spread of invasive species...unless, pursuant to guidelines that it has prescribed, the agency had determined and made public... that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.” The Proposed Action involves the use of temporary access trails that have the potential to spread existing noxious weed populations.

### **Other applicable laws and regulations include:**

Migratory Bird Treaty Act of 1918  
Bald and Golden Eagle Protection Act of 1940 (as amended)  
Federal Noxious Weed Control Act of 1974 (as amended)  
American Indian Religious Freedom Act of 1978  
Archeological Resource Protection Act of 1980  
Executive Order 11593 (heritage resources)  
Executive Order 11988 (floodplains)

Executive Order 11990 (wetlands)  
 Executive Order 12898 (environmental justice)  
 Executive Order 13007 (Indian sacred sites)  
 Executive Order 13175 (Coordination with Indian Tribal Governments)

## 1.6.2 Federal Management Direction

Federal management direction for the Entiat 115 kV Transmission Program project area has been established by the following environmental documents to which this EA is tiered. The management plans and direction that pertain to land use on the private and state-managed lands that would be affected by the proposed action are discussed in Section 3.6 of this EA.

### Wenatchee National Forest Land and Resource Management Plan 1990 (USDA Forest Service 1990)

Approximately 950 acres or 49 percent of the analysis area for this project is located within the Wenatchee National Forest. The Wenatchee National Forest is managed in accordance with the Forest Plan, which also incorporates the land allocations and direction presented in the Alpine Lakes Area Management Plan (USDA Forest Service 1981); as amended by the Record of Decision for Amendments to Forest Service and BLM Planning Documents Within the Range of the Northern Spotted Owl and the Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (Northwest Forest Plan; USDA Forest Service and USDI BLM 1994); and as amended by the Record of Decision to Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Forest Service Land and Resource Management Plans within the range of the northern spotted owl (USDA Forest Service 2007). The Forest Plan sets overall management direction for the Forest in Forest-wide standards and guidelines (USDA Forest Service 1990).

The portions of the Wenatchee National Forest within the project area are managed in accordance with the 1990 Forest Plan under the EW-1, Key Deer and Elk Habitat, and UC-1, Utility Corridor, Management Prescriptions (USDA Forest Service 1990). The goals of these Management Prescriptions are summarized in Table 1-1 and described below. The project area is not located in an Inventoried Roadless Area or Potential Wilderness Area.

**Table 1-1.** USDA Forest Service Management Prescriptions

Management Prescription	Goal Statement
EW-1: Key Deer and Elk Habitat	Manage deer and elk winter range to meet habitat requirements for sustaining optimum carrying capacity
UC-1: Utility Corridors	Provide and manage utility corridors to accommodate energy transmission needs
Source: USDA Forest Service 1990	

**EW-1.** The 1990 Forest Plan identifies deer and elk winter ranges as generally on the edge of the Forest, adjacent to or interspersed with other land ownerships, at low elevations on south- and/or east-facing slopes with reduced snow depth and early snow melt-off. Utility corridors are permitted subject to the determination of need and requirements to protect big game habitat (USDA Forest Service 1990, IV-118). The management goal of EW-1 is to manage deer and elk winter range to meet habitat requirements for sustaining optimum carrying capacity. The quality of forage and the amount of thermal cover combined with the amount of human disturbance are the factors that determine the carrying capacity of these areas for big game in winter (USDA Forest Service 1990, IV-113).

**UC-1.** This prescription is identified as applicable to existing and potential utility and transmission corridors and includes the land directly under and adjacent to the existing pipeline or electric transmission facility. Compatible facilities are combined in the same corridor whenever possible.

There are no inventoried roadless areas or classified wilderness areas within or adjacent to the Entiat project area.

### **BLM Spokane Resource Management Plan and Amendments, Record of Decision (BLM 1992)**

Approximately 216 acres or 11 percent of the proposed project area consists of BLM lands that are managed under the Spokane Resource Management Plan (BLM 1992). The proposed transmission line would cross two small parcels of BLM lands. Both of these parcels are within the Spokane Resource Management Plan's Scattered Tracts Management Area and managed for multiple uses.

### **Northwest Forest Plan (USDA Forest Service and BLM 1994)**

The Northwest Forest Plan (NWFP) applies to a portion of the NFS lands within the project area. These lands are designated Matrix and Riparian Reserves in the NWFP (USDA Forest Service and BLM 1994). Matrix lands are those not allocated to the six categories of designated areas identified in the NWFP: Congressionally Reserved Areas, Late-Successional Reserves, Adaptive Management Areas, Managed Late-Successional Areas, Administratively Withdrawn Areas, and Riparian Reserves. Most timber harvest and other silvicultural activities would be conducted in that portion of the Matrix with suitable forest lands, according to standards and guidelines (NWFP; C-11). Riparian Reserves consist of lands along streams, ponds, wetlands, and unstable or potentially unstable areas where special standards and guidelines direct land use. The Northwest Forest Plan was amended in July 2007 to remove survey and management mitigation measures standards and guidelines. The Forest Service and BLM issued separate Records of Decisions for this amendment (USDA Forest Service 2007; USDI BLM 2007).

### **Designation of Energy Corridors on Federal Land in the 11 Western States Programmatic Draft Environmental Impact Statement (U.S. Department of Energy and BLM 2007)**

The action alternative evaluated in this Draft Programmatic Environmental Impact Statement (EIS) identifies approximately 6,055 miles of designated Federal energy corridors on Federal lands. Approximately 61 percent of the proposed corridors follow or include existing utility and/or transportation ROWs, including the existing BPA transmission corridor that the transmission line component of the Proposed Action evaluated in this EA would parallel.

### **Final Environmental Impact Statement and Record of Decision for Pacific Northwest Region Invasive Plant Program, Preventing and Managing Invasive Plants (USDA Forest Service 2005)**

The Invasive Plant Program Final EIS amended the Forest Plan on March 1, 2006. This Final EIS provides management direction that improves the prevention of invasive plant spread and applies to the portions of the project that would be located on NFS lands. The Invasive Plant Program Final EIS provides new tools to control current invasive plant infestations, while protecting human health and the environment from adverse effects of invasive plant treatment. Mitigation measures designed to address noxious weeds are discussed in Section 2.5.6 of this EA.

### **Okanogan and Wenatchee National Forests Weed Management and Prevention Strategy (USDA Forest Service 2002a)**

These guidelines specify Best Management Practices (BMPs) to be employed during project implementation on NFS lands to control the establishment and spread of noxious weeds.

### **Forest-wide Noxious Weed Environmental Assessment, Wenatchee National Forest (USDA Forest Service 1999a)**

The assessment provides Wenatchee National Forest guidance for all Integrated Weed Management activities on NFS lands including mechanical, biological, and herbicide methods.

### **National Forest Supervisor Policy on Grizzly Bear Core Habitat (USDA Forest Service 1997a)**

The August 12, 1997 “Grizzly Bear Recovery – North Cascades Ecosystem” letter, signed by the Forest Supervisors for the Wenatchee, Okanogan, and Mt. Baker-Snoqualmie national forests, set a policy to use an interim standard of “no net loss of existing core habitat.” This interim standard will be updated during the ongoing Okanogan-Wenatchee Forest Plan revision process. The interim standard identifies Grizzly bear core habitat in areas greater than 0.3 mile from any motorized-access route or high-use nonmotorized access route and applies to portions of the project area located on NFS lands.

## **1.6.3 Other Analyses Considered and Incorporated by Reference**

The following landscape level assessments are incorporated into this EA by reference.

### **Forest Health Assessment for the Okanogan and Wenatchee National Forests (USDA Forest Service 2004a)**

The Forest Health Assessment provides a discussion of the recent history of forest health assessments for NFS lands in Washington on the east slopes of the Cascades, which includes the Entiat 115 kV Program project area (USDA Forest Service 2004a). Additionally, the Forest Health Assessment documents the general disturbance ecology and effects of fire, and the forest-wide situation of increasing insect and disease outbreaks (USDA Forest Service 2004a). The assessment concludes that the current structure of vegetation and the conditions of fuels create a high risk of severe wildfire. The assessment also indicates that eastside mesic forests have many similar characteristics of dry forest and will respond to fire, thinning, and other disturbances in a similar way.

### **Entiat Watershed Analysis (USDA Forest Service 1996)**

The Entiat 115 kV Program project area includes NFS lands within the Entiat Watershed, a Tier 1 Key Watershed designated to contribute directly to the conservation of at risk fish species. The NWFP directs that Watershed Assessments be completed before implementing management activities on National Forest land within Key Watersheds. The Watershed Assessment for the Entiat Analysis Area Version 2.0 was completed in April 1996. The intent of the Entiat Watershed Assessment is to ensure that management activities proceed with a full understanding of the ecosystem structure, composition, and function.

### **Okanogan and Wenatchee National Forests, Fire Management Plan (USDA Forest Service 2002b)**

The Okanogan and Wenatchee Fire Management Plan defines the Okanogan and Wenatchee National Forests’ program to manage wildfires and prescribed fires based on the Forest Plan and National Fire Plan (NFP) direction. This Fire Management Plan also provides guidance for fire managers at the local subunit level while they collectively implement the NFP. The “Entiat Sub Basin Fire Management Unit” section of the Fire Management Plan provides fire planning guidance for the Entiat 115 kV Program project area.

### **Okanogan and Wenatchee National Forests Roads Analysis: Entiat and Chelan Sub-Basins (USDA Forest Service 2004b)**

The USDA Forest Service adopted a Roads Analysis Policy in 2000 that requires roads analysis for all projects that construct, reconstruct, close or decommission roads, except where Forest-level roads

analysis has been completed (USDA Forest Service 1999b). Forest-level roads analysis was completed for the Okanogan and Wenatchee National Forests in 2004 (USDA Forest Service 2004b). Project-level roads analysis is not needed for this project because the existing roads accessing the existing BPA transmission lines are in place, require only restoration in places to allow access of equipment for this project, and are needed for long-term maintenance of the existing BPA lines. Temporary access trails (unimproved dirt roads without surfacing or regular maintenance) would be extended from the existing roads to the new structures during construction. These trails would be rehabilitated following construction, with the trail surface recontoured close to the original grade and revegetated.

### **System Planning and Load Forecast for 2004-2023 (District 2003)**

The purpose of this study was to determine the load forecast for the District's service area for the next twenty years. This study identified a capacity deficiency in the Entiat service area based on projected electrical demand in the valley and the effects of this demand on the existing infrastructure serving the area.

## **1.7 SCOPING AND PUBLIC INVOLVEMENT**

The USDA Forest Service, BLM, and District initiated public scoping to comply with the USDA Forest Service's NEPA procedures, which require that scoping be conducted for all environmental analyses regardless of whether the results of the analysis will be documented in an EA or EIS (Forest Service Handbook 1909.15.11). Scoping was not required at this point in the process under SEPA, but the District also formally requested information from the public and other agencies as part of this scoping effort.

A scoping package for the project was mailed on behalf of the USDA Forest Service, BLM, and District to approximately 1,000 people, organizations, and government agencies, including all District customers in the city of Entiat and the Entiat Valley, other potentially affected landowners, local public officials, and the USDA Forest Service's existing public involvement mailing lists. The public comment period extended from May 18, 2007 to June 18, 2007. Prior to public scoping, the USDA Forest Service initiated government-to-government consultation with the Confederated Tribes of the Colville Reservation and the Yakama Indian Nation. Neither Government raised any concerns about the project.

The agencies received seven written responses from six different authors. The lead agencies (the District and the USDA Forest Service) conducted content analysis of these letters and summarized the results of this analysis in a scoping report that is included in the Planning Record for this project.

## **1.8 ISSUES AND CONCERNS**

Under NEPA, issues generally refer to the relationship between actions (proposed, connected, cumulative, similar) and environmental (natural, cultural, and socioeconomic) effects. An issue is a point of disagreement or concern over the proposed action based on the environmental effects. The USDA Forest Service considers a comment to be an issue if it addresses a cause and effect relationship.

The following issues were identified based on comments made by the public and government agencies during the scoping process. These issues were identified and reviewed by the Interdisciplinary (ID) Team of resource specialists established for this project. These issues are summarized in the following subsections by environmental resource and addressed in the corresponding resource-specific sections of Chapter 3. These issues are all addressed by mitigation and did not drive the development of other action alternatives.

## **Geology**

- Building the proposed switchyard in an area subject to rock slides could present a number of problems, including an increased risk of wildfire.

## **Vegetation**

- Construction activities have the potential to increase the abundance and/or diversity of noxious weeds.
- Construction and maintenance of the proposed transmission line will require the removal of conifers and could result in reduced forest canopy in the affected area.

## **Wildlife**

- The proposed action could have detrimental effects on wildlife in the project area.
- The proposed action could directly impact mule deer habitat through impacts to vegetation.
- There could be indirect impacts to wintering mule deer from construction and operation and maintenance activities, as well as from increased human access due to project roads and trails.
- Potential impacts to mule deer could affect gray wolves and grizzly bears, which are Federally listed endangered species within the project area and depend upon mule deer as a year-round food resource and a post-emergence spring food resource, respectively.

## **Visual**

- Light generated by the proposed switchyard could affect nearby residents.
- Construction activities and the introduction of permanent structures could affect the quality of existing views from State Highway 97 Alternate (Highway 97A), which is part of the Cascade Loop Scenic Byway, as well as the views from the Columbia River and Entiat River Road.

## **Social and Economic**

- Potential rate increases required to pay for the project could negatively affect the city of Entiat and valley residents.
- Potential impacts to mule deer could affect mule deer hunting, which is a highly valued, traditional activity within the project area, and an important source of tourist revenue to local communities.
- Traffic associated with construction and operation of the proposed switchyard could generate traffic impacts on Highway 97A.

## **Health and Safety, including Fire and Noise**

- Noise generated by the proposed switchyard could affect nearby residents.
- Falling rocks and boulders could hit the proposed switchyard and potentially spark a wildfire.

Other comments submitted during scoping requested that certain analyses be performed in the EA. These comments are not summarized here but are documented in the scoping report prepared for the project (Tetra Tech 2007). The requests for analyses were evaluated by the resource specialists responsible for evaluating the potential effects of the proposed alternatives and considered in the following document, as appropriate.

## **1.9 ORGANIZATION OF THE DOCUMENT**

This EA has been prepared in accordance with the CEQ regulations implementing NEPA (40 CFR Parts 1500-1508) and requirements established under SEPA (WAC 197-11). The EA is organized as follows:

Chapter 1 – Purpose and Need. Explains the purpose and need for the proposed action, provides background information, and describes the issues raised during the public scoping process.

Chapter 2 – Alternatives. Describes how the alternatives were developed, the alternatives considered in detail, the project components, the proposed mitigation measures, and the alternatives considered, but eliminated from detailed study, and also provides a summary of the environmental impacts of the alternatives.

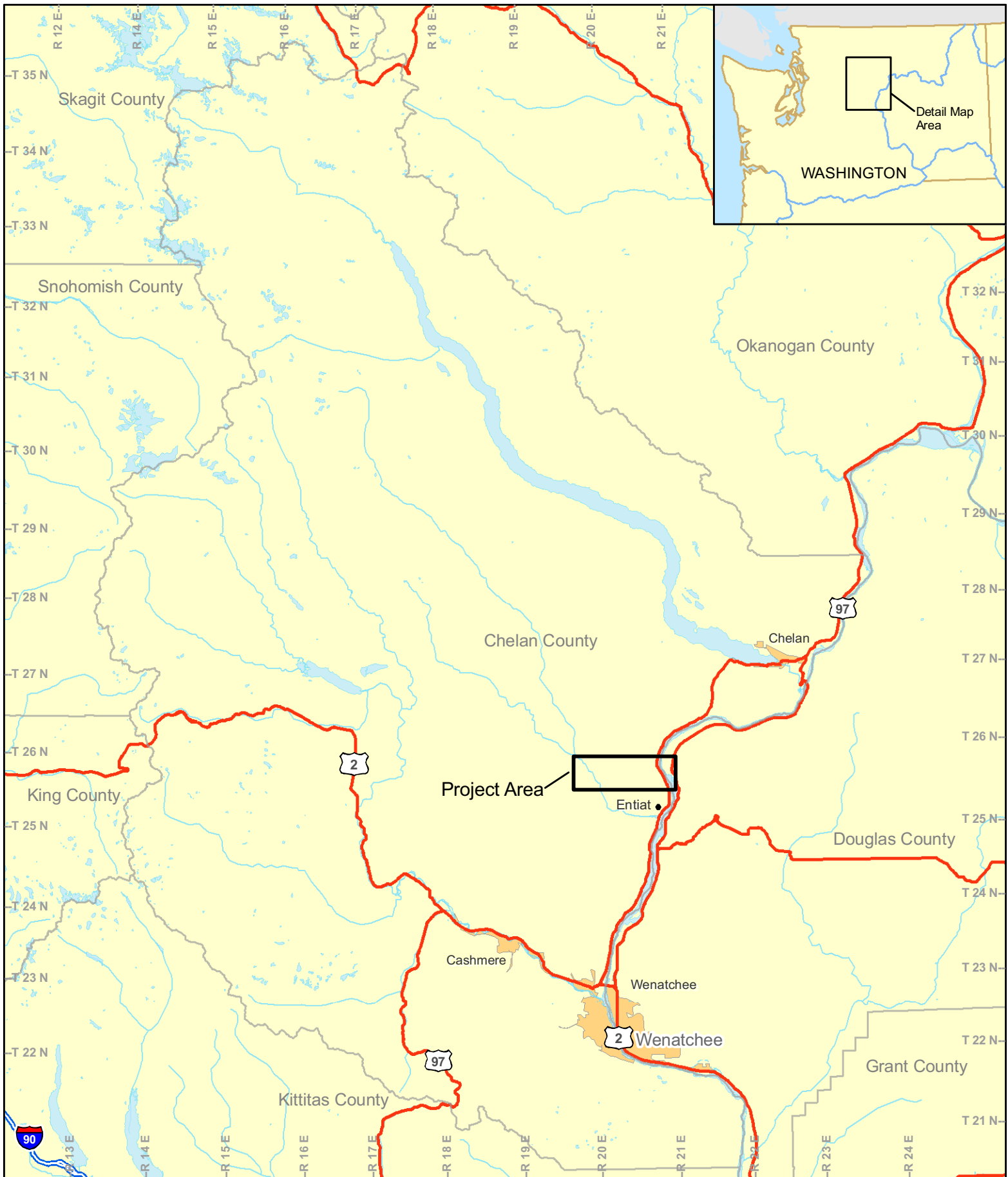
Chapter 3 – Affected Environment and Environmental Effects. Describes the affected environment and the direct, indirect, and cumulative effects of the alternatives on each resource area.

Chapter 4 – References. Lists the references cited in this EA.

Chapter 5 – List of Preparers and Agencies/Persons Consulted. Identifies those individuals that prepared and contributed to this EA and lists agencies and persons consulted as part of this EA.

Chapter 6 – Distribution List. Presents a list of the people, agencies, organizations, and institutions that were provided with paper or electronic copies of this EA.

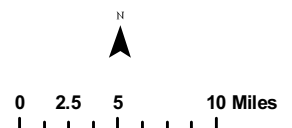
Chapter 7 – Glossary. Provides definitions of technical terms used in this document.

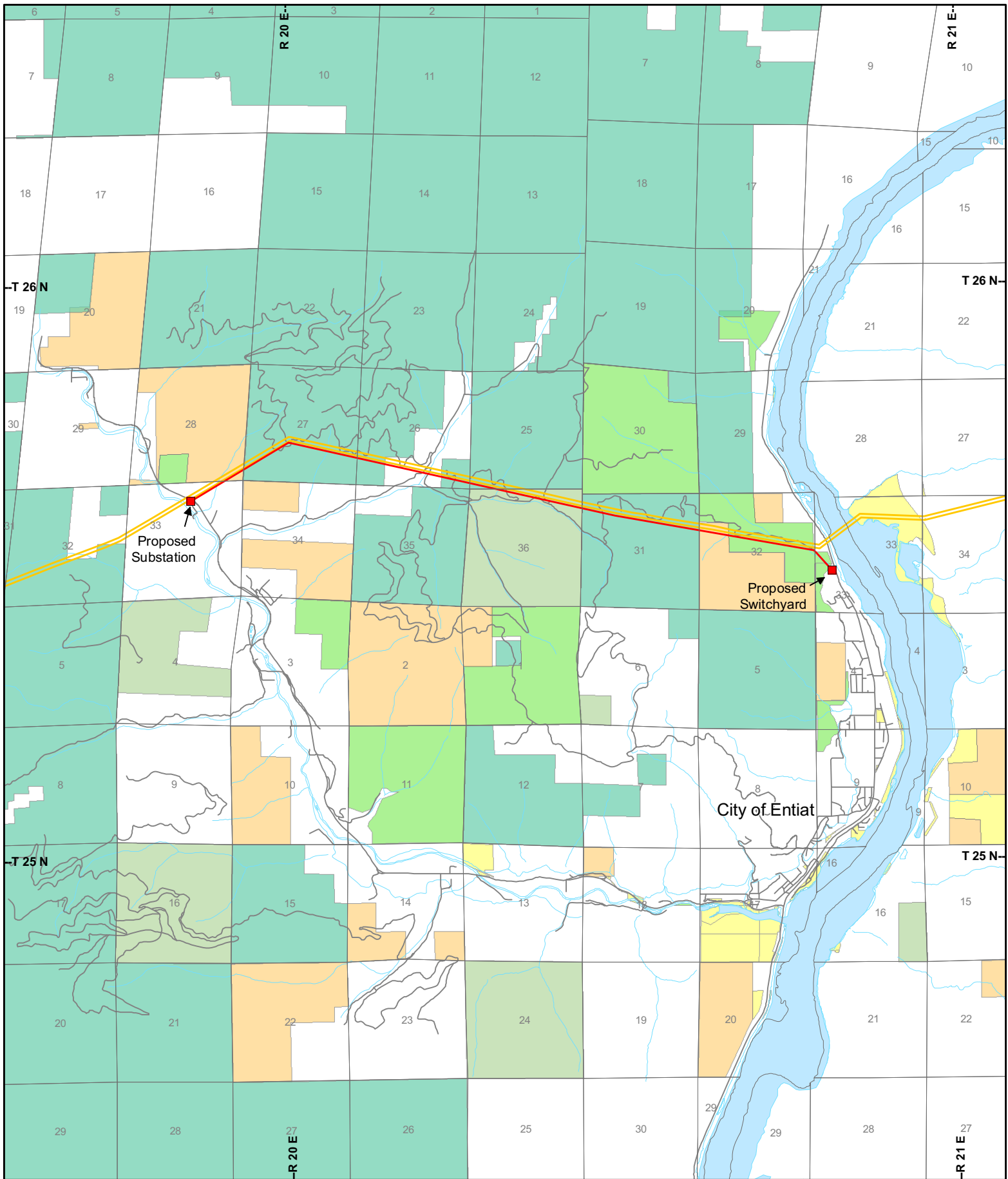


#### Legend

 Project Area

Figure 1-1 Project Vicinity  
Entiat 115 kV Transmission Line Program

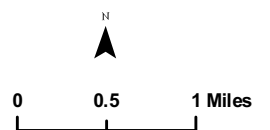




#### Legend

- Existing BPA 345 kV and 500 kV Power Line Corridor
- Proposed Transmission Line
- USBLM
- USFS
- WADFW
- WADNR
- CCPUD

**Figure 1-2 Land Ownership**  
**Entiat 115 kV Transmission Line Program**



## **2. ALTERNATIVES**

### **2.1 INTRODUCTION**

This chapter describes the proposed alternatives for the Entiat 115 kilovolt (kV) Transmission Program. The chapter is divided into six parts that describe how the alternatives were developed, the alternatives considered in detail, the project components, the proposed mitigation measures, the alternatives considered but eliminated from detailed study, and a summary of the environmental impacts of the alternatives.

### **2.2 DEVELOPMENT OF ALTERNATIVES**

In 2005, the Public Utility District No. 1 of Chelan County (District) formed the Entiat Valley Electrical Upgrade Focus Group (Focus Group), which consists of local residents and Federal and state agency representatives, to assist in the development and review of potential options to improve electrical service to the Entiat Valley. In the fall of that year, the District and Focus Group initially identified nine route options, including No Action. The District commissioned a feasibility study to explore these options and solutions from an engineering and constructability perspective. These options and the findings of the feasibility study were reviewed and discussed in Focus Group meetings. This process is discussed in more detail in Section 2.6.

### **2.3 ALTERNATIVES CONSIDERED IN DETAIL**

There are two alternatives evaluated in detail in this Environmental Assessment (EA): Alternative 1 – Proposed Action and Alternative 2 – No Action. These alternatives are described below.

#### **2.3.1 Alternative 1 – Proposed Action**

Alternative 1 would involve construction of approximately 5.8 miles of new 115 kV electric transmission line from a new switchyard that would be constructed near Earthquake Point to a new substation that would be located in the Entiat Valley, just north of Crum Canyon (Figures 2-1 and 2-2). The proposed action is located within Township 25 North (T25N), Range 19 East (R19E): Sections 28, 33; and T25N, R20E: Sections 25, 26, 27, 30, 34, 35, 36, 31, 32, and 33.

The proposed transmission line would parallel the south side of the existing Bonneville Power Administration (BPA) 345 kV and 500 kV transmission line corridor for the majority of its length. The proposed line would cross public lands managed by the U.S. Department of Agriculture (USDA) Forest Service (2.6 miles), U.S. Department of the Interior Bureau of Land Management (BLM) (0.4 mile), Washington Department of Natural Resources (WDNR) (1 mile), and Washington Department of Fish and Wildlife (WDFW) (0.9 mile). The remainder of the line (0.9 mile) would cross private lands. The transmission line right-of-way (ROW) would be 140 feet in width, 70 feet either side of the centerline.

Access to the proposed transmission line would be via existing BPA access roads, which would be extended out to the new structures where necessary. Approximately 17 temporary “spur trails” would be extended from the existing roads to the new structures during construction. Structures would be delivered and set by helicopter in a limited number of locations (approximately nine). Access to the remaining three structures would be via existing roads. H-frame steel construction would mostly be used, except for deadends and line angles, where three pole structures would be used. Additional information is provided in the following section (Section 2.4), which describes the project components in more detail.

#### **2.3.2 Alternative 2 – No Action**

This alternative is required under both the National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA). Under this alternative there would be no project and the District

would continue to serve the Entiat Valley via the existing transmission and distribution system. The No Action alternative would not meet the project's identified purpose and need to correct the electric transmission capacity deficiency and reliability issues in the District's Entiat service area.

## 2.4 PROJECT COMPONENTS

This section discusses the components of Alternative 1 – Proposed Action that could have environmental effects. The following discussion is divided into eight parts that address ROW acquisition, access, laydown areas, transmission facilities, switchyard, substation, system maintenance, and present a summary of estimated ground disturbance.

### 2.4.1 Right-of-Way Acquisition and Clearing

Alternative 1 would be located adjacent to the south side of the existing BPA transmission line corridor. The existing BPA corridor consists of two electric transmission lines: a double-circuit 345 kV line (Chief Joseph – Snohomish Nos. 3 and 4), which was built in the early 1950s; and a single-circuit 500 kV line (Chief Joseph – Monroe No. 1), which parallels the south side of the double circuit 345 kV line and was built in the late 1960s.

The majority of Alternative 1 (approximately 86 percent) crosses public lands managed by the USDA Forest Service (2.6 miles), BLM (0.4 mile), WDNR (1 mile), and WDFW (0.9 mile). The remainder of the line (0.9 mile) would cross private lands (Table 2-1). Alternative 1 would require easements for five private parcels from four private land owners, as well as a special use permit from the USDA Forest Service, a ROW grant from the BLM, and easements from WDNR and WDFW. For private lands, the District's first preference would be to negotiate a mutually satisfactory easement with each landowner. The proposed transmission line ROW would be 140 feet in width, 70 feet either side of the centerline.

**Table 2-1. Total Affected Miles and ROW Area by Land Ownership**

<b>Ownership</b>	<b>Linear Distance (miles)</b>	<b>ROW Area (acres)<sup>1/</sup></b>	<b>Percent of Total</b>
USDA Forest Service	2.6	44	45
WDFW	0.9	15	16
BLM	0.4	7	7
WDNR	1.0	17	17
Private	0.9	15	16
<b>Total</b>	<b>5.8</b>	<b>98</b>	<b>100</b>
Notes: ROW – right-of-way 1/The ROW area was estimated by multiplying the linear distance by the ROW width of 140 feet. Vegetative clearing within the ROW would be mainly limited to trees that could potentially affect the transmission line (see Table 2-3).			

Clearing within the ROW would be limited to vegetation that could potentially affect the transmission line, mainly trees that exceed transmission line clearance requirements, which vary relative to the location of the structures and projected line sag. An estimated 150 trees on Federal (National Forest System [NFS] and BLM) lands would need to be cut under this alternative (Table 2-2). In addition, an estimated 19 trees and 6 trees would be cut on WDNR land and WDFW land, respectively. Trees that are 20 inches diameter at breast height (dbh) or larger would be topped to enhance wildlife habitat. Other trees may also be topped to meet standards for snag retention. The majority of the cut trees would be downed and left along the ROW, except in areas where they would exceed fuel load density. If adjacent to an existing access road, downed trees could be removed for disposal as fuel wood or logs.

Approximately 1,200 linear feet of the 2,350 linear feet of forested ROW on Federal lands would need to be cleared with approximately 50 percent of the vegetation cleared in these areas (USDA Forest Service 2008). This would result in an estimated 84,000 square feet (1.9 acres) of vegetation disturbed. The

vegetation that would be cut in these areas includes the vast majority of the trees on Federal land that would need to be cleared (Table 2-2). However, a limited number of the trees counted in Table 2-2 (primarily larger pine or Douglas fir in the 20-inch dbh plus category) are isolated and located outside the cleared areas.

**Table 2-2. Estimated Tree Removal on Federal Lands**

Tree Height	Tree (dbh)	Total Trees within ROW		Estimated Trees to be Cut		
		NFS	BLM	NFS	BLM	Total
<50	<14 inches	357	10	72	<2	74
50-65	14 – 20 inches	368	20	58	<2	60
>65 feet	> 20 inches	37	5	14	<2	16 <sup>1/</sup>
	<b>Total</b>	<b>762</b>	<b>35</b>	<b>144</b>	<b>&lt;6</b>	<b>150</b>
Notes: dbh – Diameter at breast height < – less than > – greater than BLM – Bureau of Land Management NFS – National Forest System ROW – right-of-way 1/Trees that are 20 inches dbh or larger would be topped and made into snags to enhance wildlife habitat. Source: USDA Forest Service 2008						

In addition to permanent easements or ROWs, the District would obtain a temporary encroachment permit from the Washington State Department of Transportation and Chelan County to cross Entiat River Road during installation of the conductors, because traffic would need to be controlled where the conductors cross or approach the highway. The District would also require a road access permit to construct a new access road from Entiat River Road to the proposed substation site.

## 2.4.2 Access

Access to the proposed transmission line would be via existing BPA access roads, which would be extended out to the new structures where necessary. Approximately 17 temporary access trails would be extended from the existing roads to the new structures during construction. Helicopters would be used to deliver and set structures in approximately nine locations. Access to the remaining three structures would be via existing roads. The approximate locations of the proposed new access trails are shown in Figures 2-1 and 2-2, which also show the approximate locations of the proposed transmission line structures. More detailed information is available for review in the planning record for this project.

The proposed trails would be unimproved dirt roads without surfacing or regular maintenance. These trails would be formed by construction equipment repeatedly driving along the same route. The construction contractor would flag the trails in the field and limit their width, which is expected to average about 18 feet wide. This average width takes into account areas where the trails would be wider to accommodate turning vehicles. The trails would be narrower in locations where they would be primarily limited to tracks created by the wheels of vehicles. As a result the following estimate of total trail-related disturbance likely represents an overstatement of the potential impacts.

Approximately 4,100 linear feet (0.8 mile) of temporary access trails would be constructed under this alternative. Assuming an average trail width of 18 feet, as noted above, this construction would disturb approximately 1.7 acres of vegetation. The proposed trails are expected to be distributed by land ownership as follows: USDA Forest Service (0.32 mile), BLM (0.03 mile), WDFW (0.19 mile), WDNR (0.21 mile), and private (0.04 mile).

Temporary access trails would be rehabilitated following construction, with the trail surface recontoured to close to the original grade and revegetated. Regular maintenance of the proposed transmission line would not require motorized access.

Improvements would also be required in some areas along the existing BPA access roads. The existing BPA roads are unsurfaced (dirt) roads that were originally constructed as permanent roads and have been generally maintained to allow access for BPA vehicles. Portions of these existing roads would need some blade work to make them safe for the larger vehicles (pole tractors and tractor trailers) needed for transmission line construction.

### **Control of Unauthorized Access**

Temporary access trails would be posted with signs warning unauthorized personnel to keep away from construction activities. As noted above, the trails would be rehabilitated following construction and, as a result, no increase in unauthorized access to the area is anticipated. Trees that need to be removed from the ROW may be placed across the rehabilitated trails to prevent access.

### **2.4.3 Laydown Areas**

Three temporary work laydown areas (each approximately 200 feet by 200 feet in size) have been identified for use during project construction. All three work areas are located on previously disturbed NFS lands and adjacent to existing access roads (see Figures 2-1 and 2-2). Laydown Area 1 is a former log landing; the other two laydown areas are located at the intersections of several existing roads. The proposed switchyard and substation sites would also be used as temporary laydown areas.

Structure poles would be staged in these areas prior to construction. The structures would be stored on cribbing. Trails would form around these areas as a result of repeated use and it may be necessary to lay crushed rock in some areas. All fill material would be removed following construction and the temporary laydown areas would be recontoured to close to original grade and revegetated.

As noted above, all three proposed laydown areas would be located in previously disturbed areas. Assuming for the purpose of analysis that approximately 50 percent of each laydown area would be newly disturbed, each laydown area would disturb approximately 0.46 acre of vegetation with a combined disturbance of approximately 1.4 acres.

### **2.4.4 Transmission Facilities**

#### **2.4.4.1 Construction Season**

In general, construction would be planned for the snow-free months of the year, generally April through October. Construction work would not take place during prolonged wet weather conditions due to erosion and soil compaction concerns, and would also not take place during heavy snow or sustained below-freezing conditions for safety reasons. Construction could be further constrained by fire season closures on public lands and by closures related to protection of critical breeding or migratory periods for certain wildlife species. No construction activities would occur in designated deer winter range between November 1 and April 15 (see Section 2.5.7).

#### **2.4.4.2 Structures**

Two pole, H-frame steel construction would mostly be used, except for dead ends and line angles where three pole structures would be used. Three-pole structures are used where there is a turning point in the line and the line needs extra support in each direction or to support very long spans. A total of 29 structures are proposed at this time (see Figures 2-1 and 2-2 for approximate locations). The proposed structures are expected to be distributed by land ownership as follows: USDA Forest Service (13 structures), BLM (3 structures), WDFW (5 structures), WDNR (4 structures), and private (4 structures).

All structures would be Korten, self-weathering steel for increased reliability and aesthetic appearance. The structures would range in height from 50 feet to 140 feet aboveground based on the terrain. Two-pole construction would consist of two poles supporting a 44-foot cross-arm. An X-brace assembly would provide additional structural support for the structures ranging in height from 70 to 140 feet. Three-pole structures would consist of three unbraced single shafts ranging from 50 to 85 feet in height.

Structures would be Korten, self-weathering steel, as noted above, with a special high-carbon steel coating that rusts brown to help them blend into the landscape without compromising the strength or durability of the structures.

### **Site Preparation**

Each structure location would be prepared by clearing the area of brush and leveling two pads approximately 30 by 30 feet in size, except in those locations where holes would be dug by hand and structures installed by helicopter.

A total of 17 structures would be installed using trail roads, with three other structures accessed via existing roads. The remaining nine structures would be set by helicopter and the holes dug by hand, limiting the amount of vegetation that would need to be cleared (see Figures 2-1 and 2-2).

Industry standard for installation of transmission or distribution poles or structures requires that 10 percent of the pole length be buried in rock, with an additional 2 feet of depth if constructing in earth. For example: a 55-foot tall pole would be buried 5.5 feet in rock and 7.5 feet in earth (Shoemaker et al. 1997). Pole diameters range from 21 to 26 inches. Each hole would need to be wide enough to accommodate the pole and subsurface irregularities. Therefore, holes are usually dug one to two feet wider than the pole butt diameter, allowing for 6 to 12 inches of maneuvering room for pole installation. Holes are routinely dug somewhat deeper than final installation depth to accommodate slough during construction and to assure at least the minimum required depth.

### **Structure Delivery and Installation**

Structures would be transported to the site by truck or helicopter, placed into the holes prepared ahead of time, and backfilled. Structures would be delivered by truck where access via existing road and temporary access trail is possible. Helicopter delivery would be used in areas that are difficult to access. Backfilling would be generally accomplished with the same native material removed from the hole, although at times clean gravel or a concrete mix may be used where native material would not provide the needed stability and strength. The backfilled soil would be compacted with an attachment on the backhoe or with a hand-operated tamper, and the earth mounded around the structure to take into account the settling that may occur during the first year following construction.

Depending on the structure and the method of delivery, the structure would be either assembled on-site or delivered fully assembled. For on-site assembly, the cross-arm, cross-bracing, insulators, and guide pulleys for the conductor installation would be installed by hand crews climbing the structures or by hand crews using bucket trucks. Guy wires, if needed, would be anchored to the ground using anchor rods that are either dug in at an angle or drilled in if the substrate is solid.

Helicopter delivery could include off-site structure assembly, in which case the helicopter would pick up the assembled structure at the laydown area and fly it directly to the site of installation. In these cases the hand crew would receive the structure, stabilize it, and do the backfilling immediately after delivery.

### **2.4.5 Switchyard**

The proposed transmission line would be energized in 2009 through an interim (“shoo-fly”) connection at the switchyard location. The proposed switchyard would be constructed in 2011. This overall schedule would also be dependent on the District’s budget and budgetary approval.

The switchyard would occupy approximately 2 acres and consist of a fenced and secured graveled yard containing steel structures and metal clad switchgear to switch the power from the existing Rocky Reach-Chelan transmission line to the proposed transmission line. The switchyard would allow the new line to be segregated from the existing line in the event of an outage and possibly contain the outage to the area of the fault or problem. If an outage were to occur on the Rocky Reach-Chelan transmission line and a switchyard was not incorporated, the new line would also experience the outage. The switchyard would be set back approximately 100 to 200 feet from State Highway 97 Alternate (Highway 97A). An unpaved access road from Highway 97A currently exists on the proposed switchyard site. The District would improve this road, which would provide construction and operation and maintenance access to the proposed switchyard.

The switchyard site would be separated from the nearby Shadow Ridge housing development by the intervening topography and existing vegetation. The topography and existing vegetation would shield the switchyard from the view of homes in the development.

### **2.4.6 Substation**

The proposed substation would be built in 2010. The substation would occupy approximately 1.5 acres and consist of a fenced and secured graveled yard containing transformers and switches to accommodate the change from transmission to distribution voltage. The pear trees that currently occupy the site would be cleared and the site would be excavated and insulating rock would be installed. A temporary silt fence would be installed during construction. The proposed substation site is lower than Entiat River Road, which borders the site to the east, and would be partially shielded from view. The District would further screen the proposed substation from the road using arborvitae or other vegetation, which would form a vegetative screen from the road approximately 8 to 12 feet tall.

An access road would be constructed directly from Entiat River Road to the substation. The existing access road that borders the site to the west would be widened to accommodate a mobile substation in case of emergency.

### **2.4.7 System Maintenance**

Annual visual inspections of the new transmission line would be conducted via helicopter. It is anticipated that the newly installed structures and conductors would not need replacement or major repairs, assuming predicted growth rates in demand and barring natural disasters, including wildfire and ice storms, for about 25 years. Life expectancy for the system is at least 50 years. The ROW and former trails would also be checked at least annually as part of other routine work during snow-free periods. Weeds would be monitored annually. If weeds are found to have spread, they would be controlled either through herbicides applied by a licensed pesticide applicator under contract to the District or by mechanical or manual removal, depending on the landowner or land managing agency direction and permits (see Section 2.5.6).

### **2.4.8 Summary of Ground Disturbance**

Alternative 1 would disturb an estimated 8.8 acres of vegetation (Table 2-3). All but 3.5 acres of this disturbance would be temporary with disturbed areas recontoured and revegetated following construction. Disturbance associated with the proposed switchyard (2 acres) and substation (1.5 acres) sites would be

permanent or at least for the foreseeable future. Both of these areas have been disturbed in the past. The substation site is currently a pear orchard.

**Table 2-3. Estimated Ground Disturbance (acres)**

Project Component	Land Ownership					
	NFS	BLM	WDFW	WDNR	Private	Total
Structures <sup>1/</sup>	0.2	0.0	0.0	0.0	0.0	0.3
ROW clearing <sup>2/</sup>	1.9	0.0	0.0	0.0	0.0	1.9
Trails	0.6	0.1	0.4	0.5	0.1	1.7
Switchyard	0.0	0.0	0.0	0.0	2.0	2.0
Substation	0.0	0.0	0.0	0.0	1.5	1.5
Laydown Areas	1.4	0.0	0.0	0.0	0.0	1.4
<b>Total</b>	<b>4.1</b>	<b>0.1</b>	<b>0.4</b>	<b>0.5</b>	<b>3.6</b>	<b>8.8</b>
Note: 1/Structure-related disturbance on BLM, WDFW, WDNR, and private lands sums to approximately 0.1 acre. 2/The 1.9 acres of ROW clearing represents areas where trees would be felled or trimmed. Ground disturbance is expected to be minimal in these areas.						

## 2.5 MITIGATION

### 2.5.1 Introduction

Mitigation under both the NEPA (40 Code of Federal Regulations [CFR] 1508.20) and SEPA (Washington Administrative Code [WAC] 197-11-768) includes:

- Avoiding the impact altogether by not taking a certain action or parts of an action;
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts;
- Rectifying the impact by repairing, rehabilitation, or restoring the affected environment;
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and/or
- Compensating for the impact by replacing, enhancing, or providing substitute resources or environments.

SEPA also includes the following in its definition of mitigation (WAC 197-11-768[6]):

- Monitoring the impact and taking appropriate corrective measures.

The following sections list the proposed mitigation measures by resource area. Mitigation measures that are applicable to more than one resource area are only listed once under the resource area that appears first.

These mitigation measures were identified by the appropriate resource specialists and their potential effectiveness was reviewed and evaluated by the Interdisciplinary Team based on their past experiences with these and other measures in the vicinity of the project area and elsewhere in eastern Washington. The proposed measures are consistent with the requirements of the land management and use goals, policies, and ordinances established for lands in the project area.

### 2.5.2 General

1. A Construction/Environmental Inspector will be designated by the District and approved, as required, by the land-managing agencies where work is carried out on Federal or state lands. The

Construction/Environmental Inspector will be responsible for overseeing project environmental protection measures. The Construction/Environmental Inspector will be responsible for pre-construction identification of sensitive resources, including flagging and staking, and will be responsible for ensuring compliance with all environmental protection measures. The Construction/Environmental Inspector will have the authority to temporarily stop work that is in violation of these measures until the construction manager can be contacted and a mutually satisfactory solution to the violation can be identified. The Construction/Environmental Inspector will be on site during construction activities, including clearing, any road access work, all transmission line and distribution line construction, and cleanup and restoration activities.

2. All trash and food items generated by construction and maintenance activities will be promptly stored or removed daily from the project site.
3. All unused materials and equipment will be removed from the area upon completion of work.
4. At the conclusion of work, all holes will be completely filled, surfaces cleaned and smoothed, and each site recontoured to match the original profiles as closely as possible.
5. All stakes, flagging, and fencing used to identify and delineate sensitive and other locations in the construction area will be removed no later than 30 days after construction and restoration are complete.
6. Clearing limits established for this project will be painted or flagged on the ground, and will be enforced by the Construction/Environmental Inspector during construction.

### **2.5.3 Air Quality**

1. Dust control measures will be imposed on construction contractors whenever dust plumes from construction, road access, or road maintenance exceed 60 feet in height more than 100 feet from the centerline of the work area. Dust control will be achieved by use of water or water-based biodegradable polymers or other compounds approved for dust control in Washington State.
2. All vehicle engines will be in good operating condition to minimize exhaust emissions.
3. Any burning of piles will comply with the Washington State Smoke Management Plan and take place during times when unstable atmospheric conditions provide for smoke dispersal.

### **2.5.4 Soils**

1. A Stormwater Pollution Prevention (SWPP) Plan will be developed and implemented to minimize erosion and sedimentation.
2. Structures and new temporary access trails will be located as far as possible from nearby streams.
3. Existing roads will be used to the extent possible.
4. The three identified laydown areas are located in previously disturbed areas. Portions of these areas that would be newly disturbed during construction would be planted with a seed mix approved by the appropriate land-managing or regulatory agency.
5. Temporary access roads and transmission structures will be located on the lowest slope gradients to the extent feasible within the overall design of the project.
6. Construction activities and access requirements will be minimized in areas with steep terrain. Hand crews will be used to dig structure holes and structures will be delivered and set by helicopter to avoid constructing temporary access roads in these areas.
7. Construction within 200 feet of surface waters will be restricted to the time period from April 15 to October 31. Exceptions will be made on a case-by-case basis by the Construction/Environmental Inspector if the soil is dry and there is no significant rain or snow predicted.

8. Where winter snowpack covers any existing roads, temporary access trails, or construction areas, a no-construction-activity period will be required following spring snow melt to allow for adequate drainage and soil stabilization. The length of this period will be based on site-specific conditions and determined by the Construction/Environmental Inspector.

During the no-construction periods, adequate drainage will be maintained on all temporary access trails. Waterbars, constructed by hand or machine will be installed at the following intervals:

<u>Percent grade</u>	<u>Average Spacing (feet)</u>
2-10	150
11-20	120
21-34	90
35 or greater	80

9. Silt fences, mulch, native grass seed, or other erosion and sediment control mitigation measures will be employed to minimize and mitigate short-term erosion and sedimentation hazards on a site-specific basis in locations where road construction, heavy travel, grading, or disturbance will occur.
10. Signs restricting access to the temporary access trails will be posted during construction.
11. All temporary access trails will be decommissioned following construction. These trails will be sub-soiled or scarified prior to seeding and planted with a seed mix approved by the appropriate land-managing or regulatory agency. Obstructions, such as large rocks, will be placed in the recontoured areas to restrict unauthorized access.
12. Spoils from structure excavations (native excavated material not used as backfill) will be spread to conform with existing contours.
13. All construction areas (including temporary access trails) will be monitored to determine the need to modify any Best Management Practices (BMPs) during construction or post-construction activities.

## 2.5.5 Water

1. A SWPP Plan will be developed and implemented to minimize erosion and sedimentation.
2. A Spill Prevention, Control, and Countermeasures Plan that covers the proposed substation and switchyard sites will be implemented during construction to reduce the potential for chemical spills and transport to nearby streams.
3. Vehicles will be fueled outside of Riparian Habitat Conservation Areas (see Table 2-4 for definition) to avoid potential impacts to water quality.

**Table 2-4. Definition of Riparian Habitat Conservation Areas**

<b>Category</b>	<b>Water Body</b>	<b>Distance<sup>1/</sup></b>
1	Fish-bearing streams	300 feet or the height of two site potential trees
2	Permanently flowing non-fish bearing streams	150 feet or the height of one site potential tree
3	Ponds, lakes and reservoirs greater than one acre	150 feet or the height of one site potential tree
4	Seasonal or intermittent streams, wetlands less than one acre, landslide areas, and landslide-prone areas	100 feet or the height of one site potential tree
Note: 1/Distances in feet refer to slope distance. The Riparian Habitat Conservation Area is the greater of the two distances in each case.		

### **2.5.6 Vegetation**

Vegetation removal will be limited to the temporary access trails, substation and switchyard sites, areas around the holes for setting the poles for each structure, the laydown areas, and vegetation within the ROW that could potentially affect the transmission line, mainly trees that exceed transmission line clearance requirements, which vary relative to the location of the structures and projected line sag. The proposed transmission line corridor was selected in part because it minimized the need for road construction by allowing use of existing BPA transmission line access roads.

#### **Vegetation**

1. Locations of all proposed ground-disturbing activities will be painted or flagged on the ground prior to initiating construction, and all ground-disturbing activities will be limited to the painted or flagged areas.
2. Access road improvements and temporary access trails will be limited to the minimum necessary to safely move equipment, materials, and personnel into and out of the construction area.
3. Following construction temporary access trails will be recontoured to as close as possible to original grade and reseeded with a variety of plant species approved by the applicable land management agencies (e.g., USDA Forest Service, BLM, WDNR, and WDFW).
4. Emergency access may be required in the future, trees would not be planted on restored access roads but they would not be prevented from colonizing naturally. These temporary access routes would be documented on District maps in the event that access to the structures would be required in the future.

#### **Noxious Weeds**

1. Attached soils and plant material will be washed or otherwise removed from equipment, including trucks and other operating equipment prior to mobilizing equipment into transmission line construction sites from other areas. When working in areas where weeds are present, workers will inspect their clothing for seeds, remove any found, and properly dispose of them.
2. Weed species are currently present at different concentrations throughout the project area. An Integrated Weed Management approach, which emphasizes prevention, will be used to manage weeds within the project area. Manual, cultural (planting desirable species), biological, mechanical, or chemical treatments may be used where appropriate. Factors such as size and location of the infestation, distance to water, and proximity to sensitive habitat will determine treatment method. All disturbed areas will be stabilized and reseeded in the fall following the disturbance to further inhibit weeds from becoming established. Straw, mulch, and seeds used in revegetation efforts will be weed free.
3. Weed pre-treatment (mowing, removal of seedheads/weeds, or herbicide use, where appropriate and covered by existing Forest Service NEPA documents when applied to NFS lands) may be employed prior to disturbance in areas where weeds are heavily concentrated.
4. Regular annual transmission line inspections will include monitoring for expansions in weed populations and for new weed populations for 3 years after construction. Disturbed areas that have been reseeded (e.g., structure locations and temporary access trails) will be checked and reseeded, as necessary.
5. Seeding mixtures of native, non-native, or sterile seed sources will be reviewed on a site-specific basis and approved by the appropriate managing agency prior to use. Seed lots containing noxious weeds will not be used. Using a seed mix composed entirely of native grass seeds may allow for chemical control of herbaceous noxious weeds in disturbed areas (where allowed). These areas may be planted with approved native shrub species after noxious weeds have been effectively managed.

6. Clean gravel or a concrete mix may be used to backfill the structure holes where native material would not provide necessary stability. Gravel or fill will be obtained from a Forest Service-approved commercial source that manages its gravel for weeds. In addition, the fill source will come from a habitat similar to the project area that is exposed the same weed species that are present at the project site.
7. The District will manage noxious weeds in disturbed areas in cooperation with the Chelan County Noxious Weed Control Board and affected landowners and managers.

## **2.5.7 Wildlife**

### **Habitat Loss/Fragmentation**

1. The amount of forest and shrub-steppe vegetation cleared will be minimized by limiting clearing to those areas that are directly impacted by construction activities and trees that pose a hazard to the proposed transmission line. Outside the proposed ROW, trees that are of insufficient height to pose a hazard to the transmission line will be retained. The District will consult with the appropriate agency and/or landowner regarding the need to remove potential hazard trees prior to construction and periodically following construction, if trees outside the proposed ROW grow to sufficient height to pose a threat to the safety or reliability of the transmission line.
2. An estimated 175 trees have been identified as potential hazard trees (i.e., have the potential to fall onto the line, grow into the line within 25 years, or encroach on minimum conductor clearance standards) and would need to be cut. Trees that are 20 inches dbh or larger would be topped and made into snags. Approximately 20 of the identified potential hazard trees are 20 inches dbh or larger. These trees are scattered along the ROW. Some coarse woody debris may also be used to block access to rehabilitated trails. Larger trees are most valuable for this purpose. The District will consult with the appropriate agency and/or landowner regarding any tree felling and snag/coarse woody debris requirements within or near the proposed ROW prior to cutting trees.
3. All snags within the ROW will be retained, provided they are not a safety hazard (i.e., have the potential to fall onto the line or encroach on minimum clearance standards). Snags will be created within the ROW by high topping and/or girdling coniferous species as agreed by the construction engineer, the appropriate agency biologist, and the Construction/Environmental Inspector.
4. Large downed woody debris or pulled stumps will be left or placed within the ROW.
5. Riparian corridors/draws will be spanned to the extent possible, thus retaining any existing riparian/drainage vegetation for use as wildlife travel corridors.
6. All existing downed woody material will be left in place, to extent the possible, within the ROW and along the proposed temporary access trails.
7. Potential hazard trees cut on WDFW land (approximately 6) would be replaced with new trees planted outside the proposed ROW, with 10 trees planted for each existing tree removed.

### **Wildlife Disturbance**

1. ROW clearing and construction activities will not be conducted from November 1 through April 15 to avoid disturbance to mule deer on their winter range.
2. Any areas that may require blasting will be identified and a blasting plan will be submitted to the appropriate agency for approval. Blasting or construction within 0.25 mile of known active golden eagle nests will not occur between January 1 and August 15, unless approved by WDFW. Although the only known bald eagle nest in the general project vicinity is located more than one mile away, if an active nest is located prior to or during construction, this mitigation measure will

apply. Pre-construction surveys for raptor nests would be conducted in areas where blasting is required.

3. Trees containing large stick nests will not be removed during the nesting season, typically February through July 15. If an active raptor nest is located in a tree or existing structure during initial construction operations, activities will not occur within 0.25 mile of the nest until consultation with WDFW occurs to determine the appropriate nest management action.
4. A helicopter flight plan will be developed for transit between the established laydown areas and construction sites to avoid direct overflight of bald eagle nests or winter roosts that are located in the general vicinity of the project area. This plan will be provided for review to the appropriate agency staffs.
5. Transmission conductors will be spaced a minimum of 60 inches apart to reduce the potential collision by large raptors. Construction design standards described in APLIC (2006) and the guidelines outlined in the U.S. Fish and Wildlife Service approved Avian Protection Plan Guidelines, April 2005, will be followed.
6. The project Construction/Environmental Inspector will undergo training regarding avian nest management and protection, avian risk management, and mortality reporting, and educate other District or construction staff, as necessary.
7. To minimize impacts to Chelan mountainsnails, the contractor will avoid disturbing talus in which these snails occur and avoid removing downslope materials that may destabilize talus or alter environments within it.
8. At structure sites where Chelan mountainsnails are present, holes for the structures will be hand dug. This will eliminate the need for a temporary access trail and reduce the footprint of the structure location minimizing impacts to this mollusk species and its habitat. To avoid covering snail habitat, soil removed from the structure holes will not be piled at the site, but will be spread around or deposited on the existing access road surface or at another location approved by the USDA Forest Service.

## **2.5.8 Visual Resources**

1. The two proposed transmission structures that would be located on the west slope leading into the proposed substation will be delivered and set by helicopter and holes will be hand dug to eliminate the need for temporary access roads on the slopes adjacent to Entiat River Road and the associated visual impact.
2. Steel pole structures will be specified for fabrication of Korten steel, which is a weatherized/oxidized steel and generates a protective brown rust coating. These structures will increase compatibility with the surrounding landscape.
3. Non-lustrous insulators (i.e., non-ceramic insulators) and non-specular conductors will be specified.
4. Existing vegetation will be retained between the proposed switchyard site and Highway 97A to the extent possible, to help screen the proposed switchyard from vehicles passing on the highway. Landscape plantings will also be used, as necessary, to soften the appearance of and further screen the proposed switchyard.
5. Landscape plantings will be used to soften the appearance of and partially screen the proposed substation. Alternative material colors, including the substation fencing, will be considered as a means of increasing compatibility with the surrounding landscape color.
6. Construction areas and temporary access trails will be maintained free from debris and all unused materials and equipment will be removed upon completion of construction.

### **2.5.9 Cultural Resources**

1. If ground disturbing or other activities result in the inadvertent discovery of archaeological deposits, work will be halted within 100 feet of the discovery and the State Department of Archaeology and Historic Preservation (DAHP) in Olympia and the land management agencies designated Professional Archaeologist will be contacted. Work will be halted until such time as further investigation and appropriate consultation is concluded.
2. In the event of the inadvertent discovery of human remains, work will be immediately halted in the area, the discovery covered and secured against further disturbance, and law enforcement personnel, DAHP, and authorized representatives of the concerned American Indian tribes will be contacted.

### **2.5.10 Economic and Social Environment**

1. Private landowners will be compensated for the fair value of required transmission easements and property purchases.

### **2.5.11 Noise**

1. Construction will comply with Washington State laws and regulations regarding noise levels at sensitive receptors.

### **2.5.12 Health and Safety**

1. Prior to starting construction, the contractor will prepare and maintain a health and safety plan that will comply with applicable Washington State requirements.
2. During construction the contractor will hold crew safety meetings at the beginning of each work day to review potential safety issues and concerns.
3. At the end of each work day the contractor will secure the site, as much as possible, to protect equipment and the general public.
4. To minimize the risk of fire in less-accessible forested areas, the District will establish and maintain safe clearances between the tops of trees and the proposed transmission line. Hazard trees within or adjacent to the ROW that could cause electricity to arc from the transmission line or pose a hazard if they fall and come in contact with the line will be felled or topped to create snags.
5. Contract crews will be required to carry fire suppression equipment on board all equipment and vehicles and crews will be trained in proper use of the equipment. In addition, Contractor personnel shall be trained in who to contact in case of emergencies.

### **2.5.13 Herbicides**

1. Any needed herbicide application will be conducted by a licensed operator in compliance with Washington State and Chelan County laws and regulations; landowner directions; and laws, policies, and permits from land-managing agencies, depending on location.

## **2.6 ALTERNATIVES CONSIDERED, BUT ELIMINATED FROM DETAILED STUDY**

### **2.6.1 Introduction and Overview**

#### **2.6.1.1 Introduction**

The Focus Group and the District identified nine alternatives to address the purpose and need for this project. These alternatives included Alternative 1 – Proposed Action and Alternative 2 – No Action, which are considered in detail in this EA. The District commissioned HDR Engineering (HDR) to prepare a feasibility study of the eight preliminary alternatives. The results of this feasibility study were

documented in a report (HDR 2004) and shared with the Focus Group. The feasibility report is summarized below and incorporated by reference. The feasibility report identified Alternative P1 (see Table 2-5) and P2 (the Proposed Action) as the preferred and most feasible options, based on cost, construction safety/time, and outage constraints.

The District and the Focus Group subsequently identified Alternative P2 (the Proposed Action) for detailed evaluation and a ninth action alternative (Alternative P9), not included in the original feasibility study, was identified as a potentially viable alternative. The District and the Focus Group conducted a more in-depth evaluation of these two alternatives. The results of this evaluation were documented in a report prepared by the District (District 2005) and shared with the Focus Group.

Based on these evaluations and working with the Focus Group, the District selected Alternative P2 as the Proposed Action and the Forest Service and BLM accepted this alternative as their Proposed Action. This section describes the other preliminary alternatives and explains the rationale for eliminating them from detailed study. The eight action alternatives considered, but eliminated from detailed study, are described in Table 2-5.

### **2.6.1.2 Overview of Alternatives**

The District supplies Entiat and the Entiat Valley with electricity generated by the Rocky Reach hydroelectric facility located on the Columbia River, approximately 10 miles downstream from the confluence of the Columbia and Entiat rivers. Power generated at the dam is transferred north via the Rocky Reach-Chelan 115 kV electric transmission line that parallels the west side of Highway 97A to the city of Chelan. This line would be tapped to provide electricity to the Entiat Valley under all of the preliminary alternatives considered.

Three different locations along the west side of Highway 97A were identified as potential switchyard locations where the existing line would be tapped and serve as the starting point for a new transmission line that would serve the District's Entiat Valley customers. These locations were approximately one mile north of Earthquake Point, immediately south of Earthquake Point, and just north of the mouth of the Entiat River (see Table 2-5).

The proposed transmission line would transfer power from a new switchyard to a substation located along Entiat River Road under all nine preliminary action alternatives. The substation would step down the voltage of the transferred power from 115 kV to 12.7 kV for distribution to homes and businesses along the valley. Two substation locations were considered: the existing Entiat Valley 34.5 kV substation site and a potential site located in close proximity to the existing BPA 345 kV and 500 kV overhead electric transmission lines that cross the valley. The existing Entiat Valley 34.5 kV substation would need to be upgraded to 115 kV under all of the preliminary alternatives that included this location.

The preliminary alternatives involved a number of different potential transmission line routes as summarized in Table 2-5. Parts (Alternatives P1 and P3) or all (Alternative P2) of the proposed transmission line routes paralleled the existing utility corridor formed by the existing BPA 345 kV and 500 kV transmission lines. The remaining six preliminary alternatives (Alternatives P4 through P9) involved construction of a new line or a rebuild of the existing 34.5 kV line within the Entiat Valley corridor (see Table 2-5). The preliminary alternatives are shown in Figure 2-3.<sup>1</sup>

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<sup>1</sup> The numbers of the alternative routes shown on Figure 2-3 are the same as those described here and in the summary tables, but they are not prefaced by "P" in the figure, which is directly from the feasibility report prepared for the project (HDR 2004). In other words, Alternative 1 in the figure corresponds to Alternative P1 described here, Alternative 2 to Alternative P2, and so on.

**Table 2-5. Alternatives Considered, but Eliminated from Detailed Study**

<b>PA<sup>1/</sup></b>	<b>Origin<sup>2/</sup></b>	<b>Transmission Line Route</b>	<b>Construction<sup>3/</sup></b>	<b>Terminus</b>
P1	New switchyard approximately one mile north of Earthquake Point	This route trends southwest from the new switchyard site cross-country for approximately 1.6 miles before meeting the existing BPA corridor. The route then parallels the north side of the existing corridor for approximately 2.6 miles. The line then crosses the BPA lines and parallels the southeast side of the lines for 1 mile before terminating at a new substation location.	New 115 kV transmission line on steel aboveground, H-frame structures	New substation site on the east side of Entiat River Road
P3	New switchyard immediately south of Earthquake Point	This route parallels the south side of the existing BPA corridor for approximately 3.4 miles. The route then trends southwest cross-country for approximately 2 miles before terminating at the existing Entiat Valley Substation.	New 115 kV transmission line on steel aboveground, H-frame structures	Existing Entiat Valley Substation, which would need to be upgraded to 115 kV.
P4	New switchyard on the north side of the Entiat River	Replace the existing 34.5 kV transmission line with a new 115 kV circuit and follow the existing alignment from the new switchyard site to the existing Entiat Valley Substation.	New 115 kV transmission line on wood, aboveground structures. Existing distribution circuits would be buried. The rebuild/replacement of the existing circuit would be "hot."	Existing Entiat Valley Substation, which would need to be upgraded to 115 kV.
P5	New switchyard on the north side of the Entiat River	Replace the existing 34.5 kV transmission line with a new 115 kV circuit and follow the existing alignment from the new switchyard site to the existing Entiat Valley Substation.	New 115 kV transmission line on wood, aboveground structures. Existing distribution circuits would share the same structures (distribution underbuild). The rebuild/replacement of the existing circuit would be "hot."	Existing Entiat Valley Substation, which would need to be upgraded to 115 kV.
P6	New switchyard on the north side of the Entiat River	Build a new 115 kV transmission line across Entiat River Road from the existing 34.5 kV transmission line.	New 115 kV transmission line on wood, aboveground structures. Existing distribution circuits would be buried along their current alignment.	Existing Entiat Valley Substation, which would need to be upgraded to 115 kV.
P7	New switchyard on the north side of the Entiat River	Build a new 115 kV transmission line across Entiat River Road from the existing 34.5 kV transmission line.	New 115 kV transmission line on wood, aboveground structures with distribution underbuild. Existing distribution circuits would be moved from their existing alignment and added to the new structures.	Existing Entiat Valley Substation, which would need to be upgraded to 115 kV.

**Table 2-5. Alternatives Considered, but Eliminated from Detailed Study (continued)**

<b>PA<sup>1/</sup></b>	<b>Origin<sup>2/</sup></b>	<b>Transmission Line Route</b>	<b>Construction<sup>3/</sup></b>	<b>Terminus</b>
P8	New switchyard on the north side of the Entiat River	Build a new 115 kV transmission line underground in the existing road ROW adjacent to the existing aboveground 34.5 kV transmission line.	New 115 kV underground transmission line. Existing distribution circuits along Entiat River Road would also be placed underground.	Existing Entiat Valley Substation, which would need to be upgraded to 115 kV.
P9	New switchyard on the north side of the Entiat River	This route is located on the hillside on the north and east side of Entiat River Road.	New 115 kV transmission line on steel aboveground, H-frame structures. Some single pole structures may be used near the beginning or end of the proposed line.	New substation site on the east side of Entiat River Road
<p>Notes:</p> <p>PA – Preliminary Alternative</p> <p>1/Alternative P2 later became Alternative 1 – Proposed Action, which is evaluated in detail in this EA.</p> <p>2/A new switchyard would need to be constructed under all of the alternatives. The switchyard would transfer power from the existing Rocky Reach-Chelan 115 kV transmission line to a new line. As a result, all three proposed switchyard locations intersect with the existing transmission line, which parallels Highway 97A and the Columbia River.</p> <p>3/Under a “hot” rebuild/replacement scenario new construction would take place in the same alignment while the existing circuits were energized. Outages would be required under this scenario for construction work that could not be accomplished “hot” with lengthy outages projected for the District’s Entiat Valley customers.</p> <p>Sources:</p> <p>Alternatives P1 to P8: HDR 2004</p> <p>Alternative P9: District 2005</p>				

## 2.6.2 Evaluation of Alternatives

The environmental rationale for excluding the alternatives considered from detailed evaluation is itemized for each alternative in Table 2-6. This rationale and the ability of the alternatives to meet the project Purpose and Need is discussed further in the following section.

### Alternatives P1 through P8

The initial feasibility report identified Alternative P1 (see Table 2-5) and Alternative P2 (the Proposed Action) as the preferred and most feasible options, based on cost, construction safety/time, and outage constraints (HDR 2004). The report also ranked the eight action alternatives against one another based on four key criteria: operation and maintenance, cost, environmental impact, and ROW/permitting. Although all eight preliminary alternatives (Alternatives P1 to P8) were configured to meet the preliminary purpose and need for the project, some would not meet the refined purpose and need developed for this project and discussed in Section 1.3 of this document.

Alternatives P4 through P8 would require outages for construction work that could not be accomplished “hot” with lengthy potential outages projected for the District’s Entiat Valley customers. As a result, these alternatives did not meet the refined purpose and need requirement that the project provide reliable electricity to its customers in the Entiat service area without substantially interrupting existing service (see Section 1.3). Other important concerns identified for these alternatives and Alternative P3 included construction safety concerns associated with “hot” rebuild and construction work that would involve crews working in close proximity or directly with existing facilities while they are energized. Alternatives P4 through P8 would also require closure of one lane of traffic on Entiat River Road for extended periods during construction. Entiat River Road is a two-lane road and the only means of access to the valley from Highway 97A.

Alternatives P4 through P8 would also cross the Entiat River twice and associated concerns included the potential impact to riparian vegetation and listed aquatic species. Species known to occur in the lower Entiat River include the upper Columbia River spring Chinook Salmon and upper Columbia River summer steelhead, both of which are listed as Endangered under the Endangered Species Act (ESA), and Columbia River bull trout, which is listed as threatened under ESA. Other species of concern known to occur in the Entiat River include westslope cutthroat trout and sockeye salmon (NPCC 2004).

The alternatives that involved construction of new aboveground facilities along the Entiat Valley (Alternatives P4 through P7) also raised concerns with respect to potential raptor collisions. During the winter of 2007 the District conducted field surveys for winter bald eagle communal roosts along the Columbia River and along the Entiat Valley. Surveys along the Columbia River extended south from McKinstry Canyon downstream to the mouth of the Entiat River. The Entiat Valley surveys extended from the mouth of the river up the valley to the Mad River Road junction (Cordell 2007). One roost was documented along the Columbia River, north of the project area in the Ribbon Cliffs area in a stand of large Douglas fir snags where up to 17 eagles were observed roosting. A second roost, potentially a spill-over site for the Ribbon Cliffs roost, was documented in the Entiat Valley across the Entiat River and south of the proposed substation in a Douglas fir stand containing two large snags.

Alternatives P4 through P8 were eliminated from further consideration because they failed to meet the refined purpose and need, which requires that the project provide reliable electricity to its customers in the Entiat service area without substantially interrupting existing service. This decision also took into consideration the other concerns discussed with respect to these alternatives in the preceding paragraphs and identified in Table 2-6. Alternative P3 was eliminated from further consideration because of the service interruption and potential safety concerns associated with a “hot” rebuild of the existing Entiat Valley Substation. In addition, Alternative P3 would involve construction of approximately 2 miles of

**Table 2-6.** Environmental Rationale for Elimination of Alternatives Considered, but Eliminated from Detailed Study

Preliminary Alternative	Meets Purpose and Need	Environmental Impact compared to the Proposed Action	Environmental Rationale for Elimination
P1	Yes	Similar, but greater	<ul style="list-style-type: none"> <li>• Crosses approximately 1.6 miles of undisturbed WDFW and USDA Forest Service lands, including lands within the Entiat State Wildlife Area</li> <li>• New access roads would need to be constructed in the undisturbed areas</li> <li>• Construction in the undisturbed areas would create adverse visual impacts</li> <li>• Proposed switchyard site is in a known rockslide area</li> </ul>
P3	Yes	Similar, but greater	<ul style="list-style-type: none"> <li>• Outages in electrical service and potential safety risks due to "hot" rebuild of the existing substation</li> <li>• Crosses approximately 2 miles of mostly undisturbed BLM and USDA Forest Service lands.</li> <li>• New access roads would need to be constructed in the undisturbed areas</li> </ul>
P4	Yes	Greater	<ul style="list-style-type: none"> <li>• Outages in electrical service where work could not be completed hot</li> <li>• Potential safety risks due to "hot" rebuild requirement</li> <li>• Closure of one lane of traffic on Entiat River Road for extended periods during construction</li> <li>• Crosses the Entiat River twice with potential to affect riparian corridors and create adverse visual impacts</li> </ul>
P5	Yes	Greater	<ul style="list-style-type: none"> <li>• Outages in electrical service where work could not be completed hot</li> <li>• Potential construction impacts to listed species in the Entiat River</li> <li>• Potential safety risks due to "hot" rebuild requirement</li> <li>• Closure of one lane of traffic on Entiat River Road for extended periods during construction</li> <li>• Visual impacts due to larger poles and conductor, as well as additional guying</li> <li>• Potential impacts of increased structure heights to bald eagles</li> </ul>
P6	Yes	Greater	<ul style="list-style-type: none"> <li>• Outages in electrical service where work could not be completed hot</li> <li>• Crosses the Entiat River twice with potential to affect riparian corridors and create adverse visual impacts</li> <li>• Potential construction impacts to listed species in the Entiat River</li> <li>• Potential safety risks due to "hot" rebuild requirement</li> <li>• Closure of one lane of traffic on Entiat River Road for extended periods during construction</li> <li>• Existing houses and buildings may need to be moved</li> <li>• Crosses the Entiat River twice with potential to affect riparian corridors and create adverse visual impacts</li> <li>• Potential construction impacts to listed species in the Entiat River</li> </ul>

**Table 2-6. Environmental Rationale for Elimination of Alternatives Considered, but Eliminated from Detailed Study (continued)**

Preliminary Alternative	Meets Purpose and Need	Environmental Impact compared to the Proposed Action	Rationale for Elimination
P7	Yes	Greater	<ul style="list-style-type: none"> <li>• Outages in electrical service where work could not be completed hot</li> <li>• Potential safety risks due to "hot" rebuild requirement</li> <li>• Closure of one lane of traffic on Entiat River Road for extended periods during construction</li> <li>• Visual impacts due to larger poles and conductor, as well as additional guying</li> <li>• Potential impacts of increased structure heights to bald eagles</li> <li>• Existing houses and buildings may need to be moved</li> <li>• Crosses the Entiat River twice with potential to affect riparian corridors and create adverse visual impacts</li> </ul>
P8	Yes	Greater	<ul style="list-style-type: none"> <li>• Outages in electrical service where work could not be completed hot</li> <li>• Potential construction impacts to listed species in the Entiat River</li> <li>• Potential safety risks due to excavation and other construction, while the existing line is energized</li> <li>• Impacts to existing underground utilities and other facilities</li> <li>• Closure of one lane of traffic on Entiat River Road for extended periods during construction</li> </ul>
P9	Yes	Greater	<ul style="list-style-type: none"> <li>• Crosses the Entiat River twice with potential to affect riparian corridors and create adverse visual impacts</li> <li>• Potential construction impacts to listed species in the Entiat River</li> <li>• New access roads would be needed</li> <li>• Approximately 45 "new" private easements would be required</li> <li>• Potential erosion impacts and increased noxious weed risk in new relatively undisturbed areas</li> <li>• Visual impacts associated with a new ("green field") transmission line corridor and access roads along Entiat River Road</li> <li>• Potential for impacts to bald eagles</li> <li>• Crosses the Entiat River twice with potential to affect riparian corridors and create adverse visual impacts</li> <li>• Potential construction impacts to listed species in the Entiat River</li> </ul>

new transmission line across mostly undisturbed BLM and NFS lands and require new road construction in these areas.

Alternative P1 was also eliminated from further consideration. The proposed switchyard site under this alternative was located in a known active landslide area and while the proposed transmission line route was the same as that proposed under Alternative P2 for 3.6 miles, approximately 1.6 miles would be constructed across undisturbed WDFW and NFS lands and require extensive new road construction.

### **Alternatives P2 and P9**

The District identified a ninth action alternative for evaluation following completion of the HDR (2004) study. This preliminary alternative (identified as Alternative P9 in Tables 2-5 and 2-6) involved construction of a new switchyard north of the mouth of the Entiat River and a new 115 kV electric transmission line that would follow the north side of the valley on the hillside to a new substation approximately 7.2 miles up the valley (District 2005). This preliminary alternative had a number of advantages when compared to Alternatives P4 through P8, which also followed the valley. Alternative P9 did not require that the new facilities be built “hot,” did not include projected customer outages, or require lengthy traffic closures along Entiat River Road. In addition, the existing 34.5 kV line and substation would remain in place under this alternative, providing a loop transmission system that would provide increased reliability and flexibility in the future.

The District subsequently evaluated the two remaining preliminary alternatives, Alternative P2 (the Proposed Action) and Alternative P9. A major difference between the two alternatives is that Alternative P9 would involve “green field” construction and require the development of a new transmission line corridor and new access roads in a new area. The transmission line proposed under Alternative P9 would follow the hillside on the north side of Entiat River Road and involve development of a new utility corridor across private lands. This proposed line would require the acquisition of at least 45 private easements. The District would also need to construct new access roads to each structure across private property. This would result in potential erosion concerns and the potential for an increased risk for noxious weeds in a relatively undisturbed area.

In addition, the primarily H-frame structures and the line itself would be visible from private residences along the lower valley, as well as visible to people driving in either direction along Entiat River Road. The new transmission line and associated structures would introduce a new disruptive visual element into the landscape that would have the potential to adversely affect the experience value that residents, recreationists, and others traveling through associate with the valley. The new access roads would also be visible to local residents and people traveling in the area. Environmental concerns identified with respect to Alternative P9 also included the relatively high potential for bald eagle collision associated with the new, primarily H-frame construction transmission line across the hillside.

In addition to the potential visual and bald eagle impacts associated with Alternative P9, this alternative would, as noted above, require that acquisition of at least 45 private easements. These would all be new easements in the sense that they would not parallel or follow existing utility corridors or manmade linear features. The resulting impacts to property owners of this type of easement are generally larger because the imposition of a ROW may limit the uses of that property. The patterns of land ownership and basic topography along the valley would limit the District’s options with respect to acquiring private easements, with only very limited cases where the proposed transmission line could be rerouted to avoid property owners who did not wish to provide an easement. This alternative would, therefore, depend on obtaining at least 45 private easements with the District potentially having to enter into condemnation proceedings in cases where property owners were unwilling to provide an easement. This type of easement acquisition also has the potential to be time consuming and costly for all concerned, especially if the District were required to enter into condemnation proceedings.

Based on these concerns (which are also listed in Table 2-6), the District, in conjunction with the Focus Group, decided to eliminate Alternative P9 from further evaluation and select Alternative P2 as the Proposed Action.

### Summary and Rationale for One Action Alternative

As described in the preceding section, the District and the Focus Group conducted an intensive evaluation of the full range of alternatives identified through a series of public meetings. This evaluation resulted in the identification of the Proposed Action and provided sufficient rationale to eliminate the other alternatives from further consideration. Alternatives P4 through P8 were eliminated because they failed to meet the refined purpose and need, which requires that the project provide reliable electricity to its customers in the Entiat service area without substantially interrupting existing service. Alternatives P1, P3, and P9 were eliminated because they all included substantial “green field” construction over mostly undisturbed areas and would require extensive construction of new access roads. These issues and other concerns identified with the preliminary alternatives are discussed further above and summarized by alternative in Table 2-6. As a result of this detailed public evaluation process, this document evaluates two alternatives: the Proposed Action (Alternative 1) and No Action (Alternative 2).

## 2.7 SUMMARY OF ENVIRONMENTAL IMPACTS OF ALTERNATIVES

Table 2-7 presents a summary of the environmental impacts of the two alternatives evaluated in this document. This summary is organized by potentially affected resource and the evaluation criteria identified for each resource. A full explanation of the evaluation criteria and the environmental consequences of the alternatives is presented by resource area in Chapter 3.

**Table 2-7.** Comparison of Alternatives by Resource

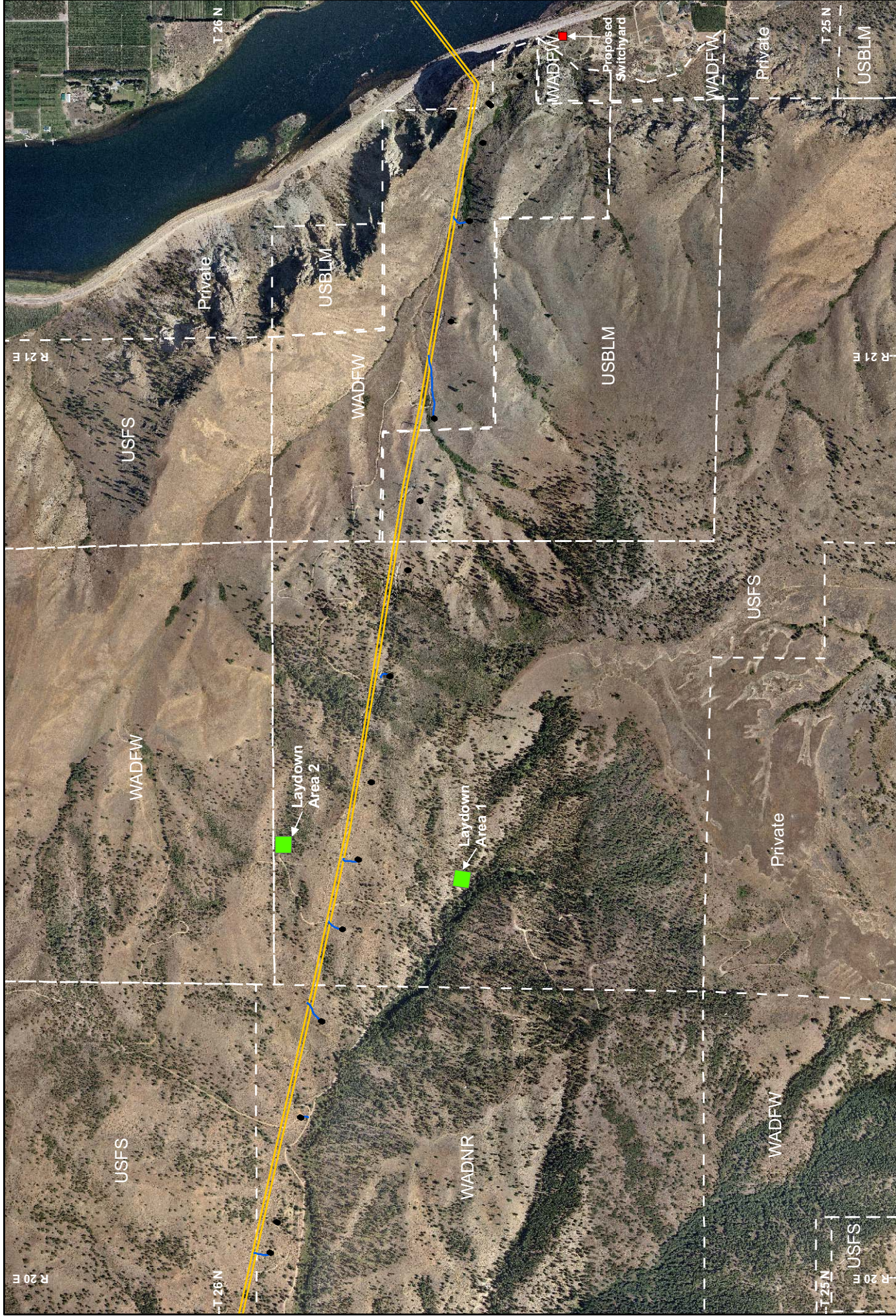
	<b>Alternative 1 - Proposed Action</b>	<b>Alternative 2 - No Action</b>
<b>PURPOSE AND NEED</b>		
Reduce existing voltage drops under normal conditions	Fully compliant. Providing a new transmission line and substation would eliminate transmission voltage drops under normal conditions	Would not meet. Existing voltage drops would continue under normal conditions.
Ensure capacity to accommodate anticipated Entiat Valley growth	Fully compliant. The new transmission line and substation would provide sufficient capacity to accommodate anticipated growth.	Would not meet. Capacity would not accommodate anticipated growth.
Reduce transmission line-related outages in the Entiat Valley	Fully compliant. Having one 115kV transmission line in conjunction with a substation and a switchyard would allow emergency switching and sectionalizing of fault areas as well as provide a reliable and adequately sized transmission system.	Would not meet. Brownouts and outages would continue.
<b>ENVIRONMENTAL EFFECTS</b>		
<b>Air Quality (Section 3.2)</b>		
Construction and Operation	Short-term reduction in local ambient air quality due to emissions from equipment and vehicle use during construction	No new impacts

**Table 2-7. Comparison of Alternatives by Resource (continued)**

	<b>Alternative 1 – Proposed Action</b>	<b>Alternative 2 – No Action</b>
<b>Soil, Water and Fish (Section 3.3)</b>		
Soil Erosion Potential in Disturbed Areas (acres)		
Slight	0.1	0.0
Moderate	1.4	0.0
Severe	6.5	0.0
Unrated	0.3	0.0
Total <sup>1/</sup>	8.3	0.0
Disturbance on soils with severe soil erosion potential within 300 feet of a stream (acres)	0.0	0.0
Soil Compaction Potential in Disturbed Areas (acres)		
Low	0.9	0.0
Medium	5.7	0.0
Unrated	0.3	0.0
Total <sup>1/</sup>	6.9	0.0
Number of Trail-Stream Crossings Related to Construction Activities	0.0	0.0
<b>Vegetation (Section 3.4)</b>		
Type of Vegetation Disturbed		
Upland Forest	3.1	0.0
Shrub-steppe	4.4	0.0
Agriculture	1.5	0.0
Total <sup>1/</sup>	8.8	0.0
Noxious Weeds	Potential effects to disturbed areas minimized by proposed prevention strategy and mitigation measures	No new impacts
Rare Plants	None identified in the analysis area	No new impacts
<b>Wildlife (Section 3.5)</b>		
Mule Deer	A minor reduction in winter range (less than 1 percent of the affected winter range units)	No new impacts
Grizzly Bear	No change to current areas of grizzly bear core habitat	No new impacts
Gray Wolf	Low level indirect impacts from minor reduction in deer winter range	No new impacts
Chelan Mountainsnail	Low level impact on existing populations minimized by proposed mitigation measures	No new impacts
Raptors and Cavity Nesters	Minor removal of mature trees; downed trees would be left on the ground as large woody debris, or high-topped and left as snags.	No new impacts
Various Species	Temporary disturbance associated with human activity during construction.	No new impacts
<b>Land Use and Recreation (Section 3.6)</b>		
New Transmission Line Construction by Ownership (miles)		
USDA Forest Service	2.6	0.0
WDFW	0.9	0.0
BLM	0.4	0.0
WDNR	1	0.0
Private	0.9	0.0
Total	5.8	0.0
Recreation Facilities	None identified in the analysis area	No new impacts
Recreation Activities and Experience	Potential short-term, localized displacement of hunters during construction	No new impacts

**Table 2-7. Comparison of Alternatives by Resource (continued)**

	<b>Alternative 1 - Proposed Action</b>	<b>Alternative 2 - No Action</b>
<b>Visual Resources (Section 3.7)</b>		
Summary of Effects	Incremental impacts to existing transmission line corridor	No new impacts
Visual Quality Objectives (VQOs) (NFS Land Only)	Consistent with VQOs established for the analysis area	No new impacts
<b>Cultural Resources (Section 3.8)</b>		
Known and Newly Documented Cultural Resources		
Previously Documented	0.0	0.0
Newly Documented	0.0	0.0
Total	0.0	0.0
<b>Social and Economic Environment (Section 3.9)</b>		
Construction Full-Time Equivalent Employment	14	0
Electric Rates	Will contribute to the District's existing need for additional revenue. Rate increases are based on rate class and type of service, not residential location.	Will not directly affect the District's existing need for additional revenue
Transportation	No noticeable impacts to traffic on Highway 97A	No New Impacts
<b>Noise, Public Health, and Safety (Section 3.10)</b>		
Noise		
Construction	Short-term, localized noise impacts.	No new impacts
Operation and Maintenance	Noise would meet all applicable noise limits	No new impacts
Electric and Magnetic Fields	Would not preclude normal public or occupational use in the affected area	No new impacts
Fire	Potential construction- and operation-related fire risk minimized by proposed mitigation measures	No new impacts
<p>Note:</p> <p>1/Project-related disturbance would likely result from the following project components: structures, limited ROW clearing, temporary access trails, switchyard site, substation site, and laydown areas. Total estimated disturbance varies by the affected resource and measure, with the following total estimates of project-related disturbance: soil erosion (8.3 acres), soil compaction (6.9 acres), and vegetation (8.8 acres). These estimates are explained further in Sections 3.3 and 3.4.</p>		

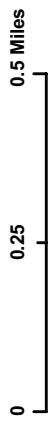


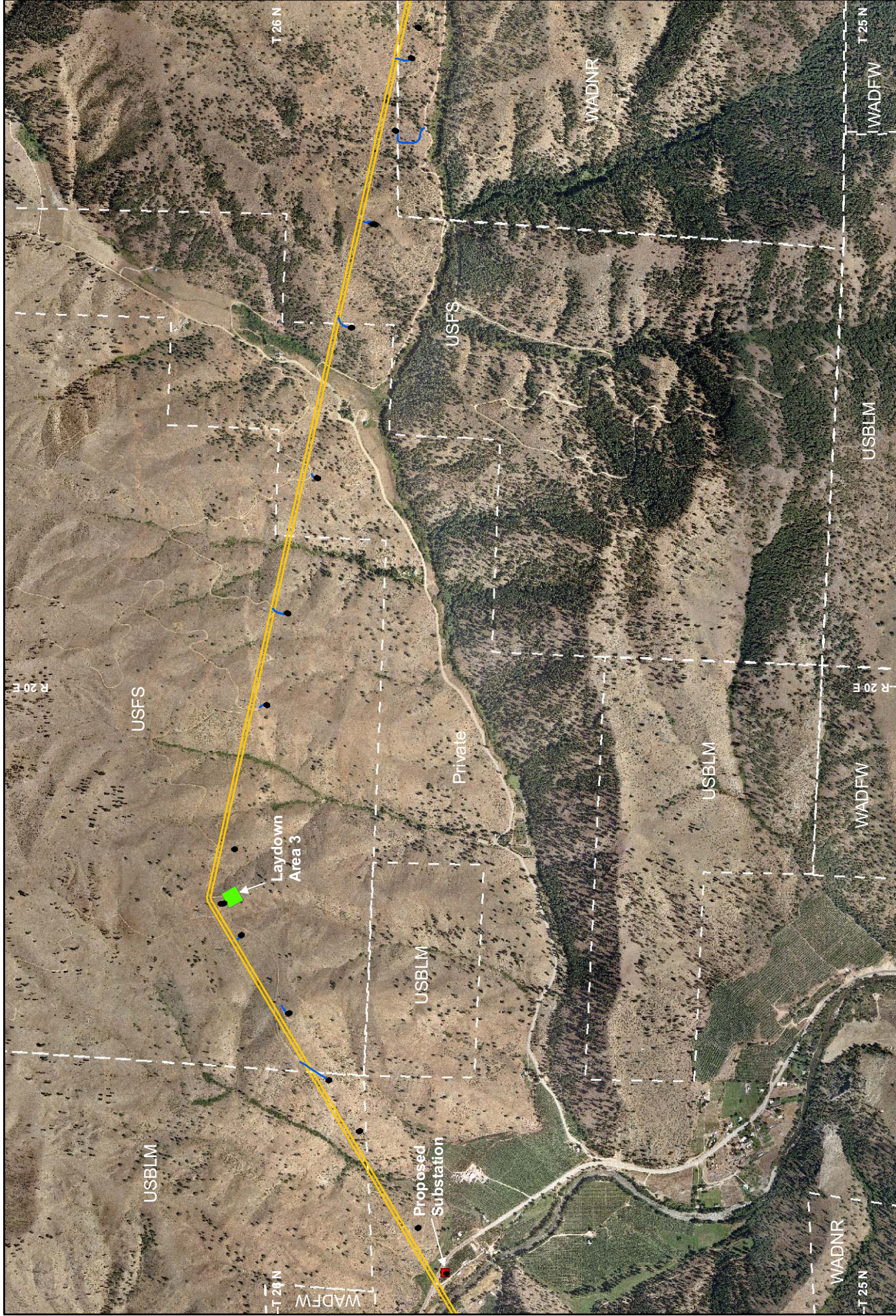
**Legend**

- Existing BPA 345 kV and 500 kV Power Line Corridor
- Proposed Trail
- Proposed Structures

**Figure 2-1 Proposed Action-East**

**Entiat 115 kV Transmission Line Program**



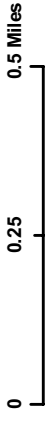


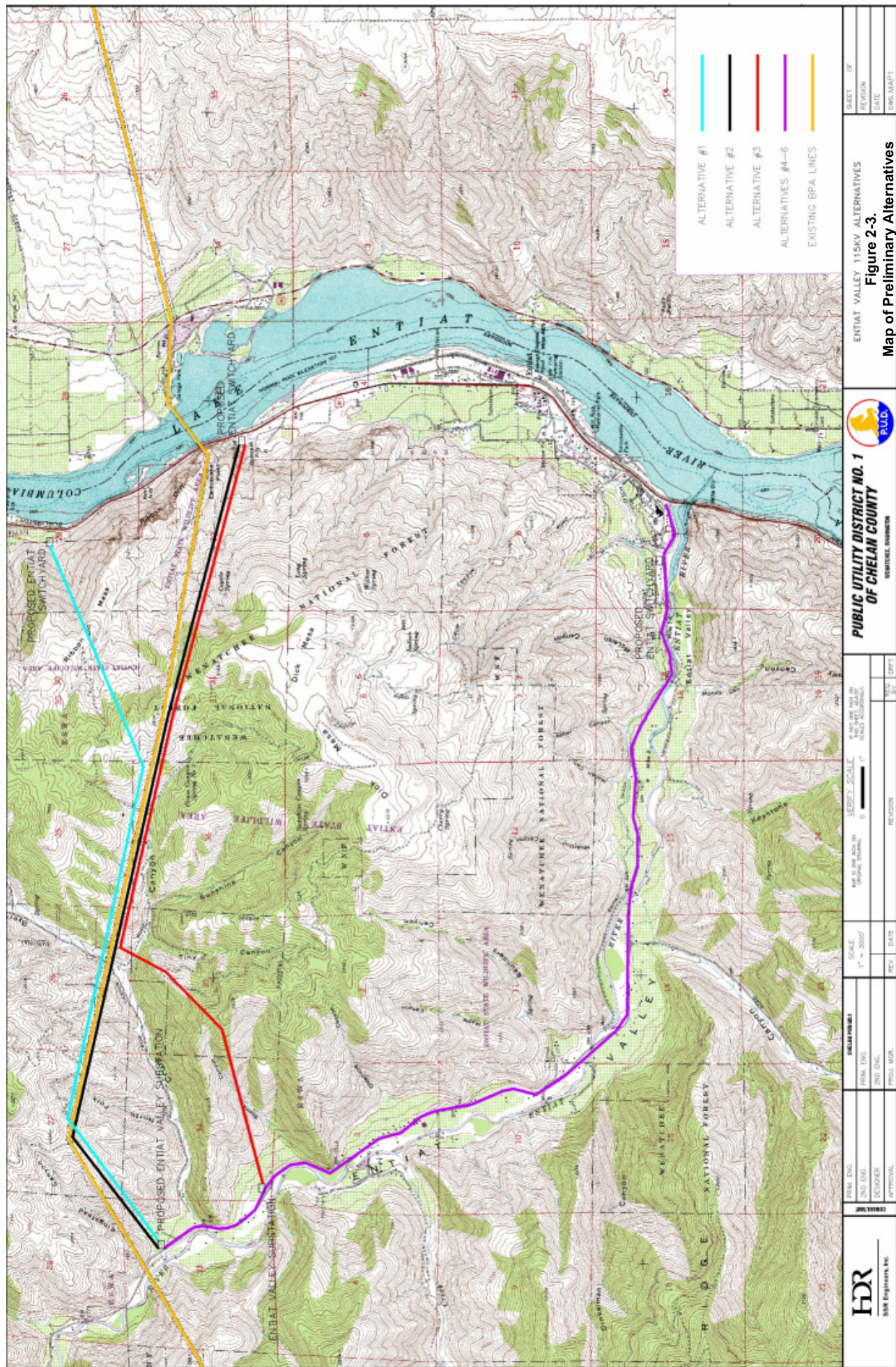
**Legend**

- Existing BPA 345 kV and 500 kV Power Line Corridor
- Proposed Trail
- Proposed Structures

**Figure 2-2 Proposed Action-West**

**Entiat 115 kV Transmission Line Program**





## 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

### 3.1 INTRODUCTION

This chapter describes the physical, biological, social, and economic environment of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. The effects disclosed have considered the effectiveness of the mitigation measures outlined in Chapter 2.

The National Environmental Policy Act (NEPA) requires a systematic, interdisciplinary approach that ensures the inclusion of both natural and social sciences in the analysis process. The Interdisciplinary (ID) Team formed for this project consisted of a team of resource specialists who reviewed comments generated during public scoping for this project and identified issues related to the proposed action. The ID Team analyzed the potential effects of the alternatives. The identified issues are addressed by resource area in this chapter. This allows the reader only interested in specific resources to find all the effects related to that resource and related issue(s) in one place. The remainder of this chapter is organized as follows:

- Air Quality
- Soils, Water, and Fish
- Vegetation
- Wildlife
- Land Use and Recreation
- Visual Resources
- Cultural Resources
- Social and Economic Environment
- Noise, Public Health, and Safety
- Other Environmental Considerations

The last section of this chapter (Section 3.11), Other Environmental Considerations, discusses those items that must be addressed under NEPA but do not typically fall under the other categories listed above. These items include irreversible and irretrievable commitments of resources, short-term uses and long-term productivity, and possible conflicts with plans and policies of other jurisdictions.

The analysis area established for the majority of resources includes a one-quarter mile buffer or corridor around the proposed Action Alternative (Figure 3.1-1). The analysis area used is identified at the beginning of each resource-specific section or subsection, as appropriate.

The following resource-specific sections are each divided into two main sections: Affected Environment and Environmental Consequences. The Affected Environment section summarizes the issues identified for the resource, describes the environment of the area that would be affected by the alternatives, and establishes the baseline environment for the environmental effects analysis. Past and present activities affecting each resource are included in this baseline description.

The Environmental Effects section for each resource is divided into four subsections: Evaluation Criteria, Alternative 1 – Proposed Action, Alternative 2 – No Action, and Cumulative Effects. The Evaluation Criteria subsection identifies the evaluation criteria established for each resource. These criteria are used as benchmarks to evaluate whether the proposed alternatives would have a significant effect on that

resource. This subsection also establishes the regulatory framework for the analysis with reference to applicable land management plans, where appropriate.

The Alternative 1 – Proposed Action subsection evaluates the potential direct and indirect effects associated with the implementation of Alternative 1. Direct effects are those occurring at the same place and time as the initial cause or action. Indirect effects are defined as those effects that occur later in time or are spatially removed from the activity (40 Code of Federal Regulations [CFR] 1508.8[b]; Washington Administrative Code [WAC] 197-11-060[4]). This analysis compares the projected impacts with the previously established evaluation criteria to assess the potential significance of the projected impacts.

The Alternative 2 – No Action subsection evaluates the potential direct and indirect effects associated with the implementation of Alternative 1. There would be no new construction or ground disturbance under the No Action alternative and for most resources there would be no direct or indirect impacts associated with this alternative, and current conditions in the project area as established in the Affected Environment section would continue unaffected.

The final subsection—Cumulative Effects—assesses the cumulative effects of each alternative. This analysis is discussed further in the following section.

### **3.1.1 Cumulative Effects**

Cumulative effects result from the incremental effects of actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

The potential effects resulting from each alternative are described in terms of their context, intensity, and duration. Activities occurring in the same area over time under certain circumstances may be incremental and produce cumulative effects. The potential effects disclosed in the cumulative effects section presented for each resource have considered the applicable past, present, and reasonably foreseeable actions.

Past and present actions affecting resources are included in the existing condition information presented in the Affected Environment section for each resource area in the following sections (3.2 through 3.10). This approach to cumulative effects analysis is consistent with current case law and guidance developed by the Council on Environmental Quality (CEQ 2005), which is incorporated here by reference. This guidance states that, generally, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions” (CEQ 2005, 2).

The following subsections provide a general overview of the past and present actions and identify the reasonably foreseeable future actions in the project area.

#### **3.1.1.1 Past and Present Actions**

The project area lies within the Entiat watershed, which has experienced a dramatic history of both human-caused and natural disturbances that have together resulted in substantial changes in the landscape over time (USDA Forest Service 1996). The effects of these changes are discussed and characterized for each resource in the following sections of this chapter (Sections 3.2 to 3.10) and form part of the environmental baseline used to assess the impacts of the proposed alternatives.

Human disturbance has played a large part in changes that have occurred in the Entiat watershed. Little data are available regarding the effects of Native Americans and early settlers on the area, but available

evidence suggests both Native Americans and prospectors set fires for various purposes. Early documented human disturbances started in the late 1800s and include the construction of irrigation diversion and hydroelectric dams, mills, timber harvest and road construction in the watershed. Most of the early documented human disturbances in the general vicinity occurred in the Entiat River valley, south and east of the project analysis area (see Figure 3.1-1). The first sawmill was established at the mouth of the Entiat River in 1892 and the first irrigation canal was established in the area in 1894. A number of other sawmills, a dam, and an electric power plant were located along the lower stretch of the Entiat River prior to 1920. These facilities all closed or moved following floods, fires, and the depletion of timber in the immediate vicinity (USDA Forest Service 1996; City of Entiat 2006). Prospecting and mining for gold and other minerals occurred in the valley between 1885 and 1910, with much of this activity concentrated around Crum Canyon (CCCD 2004).

Settlers introduced grazing to the Entiat watershed in the 1890s, with cattle, horse, and swine all grazing in the area. Sheep grazing also began in the area in the 1890s and was widespread and uncontrolled by 1900. Range conditions deteriorated steadily in the early 1900s due to unregulated grazing pressure. Restrictions on grazing subsequently began to be introduced in the 1920s to reduce the impacts of heavy use. Orchard tracts first began to appear in the valley in 1906 as part of a general shift from cattle to apples and much of the flat level ground in the Entiat Valley has since been converted to orchard use. The new substation site proposed as part of the Proposed Action is currently used as a pear orchard.

Recreational hunting in the vicinity of the project area can be traced back to the early 1900s, when mountain goats were hunted in the Entiat Mountains. Recreational use throughout the Entiat Valley has increased as the area has developed and as a result of the proximity of the area to large population concentrations. Societal trends have also influenced its popularity, as more individuals and families spend greater amounts of time participating in outdoor activities.

Construction of the Rocky Reach hydroelectric dam on the Columbia River approximately 13 miles south of the project area created the Lake Entiat reservoir and flooded the former city of Entiat in 1961. The WDFW-managed Entiat Wildlife Area, located within the project area, was subsequently established as mitigation for the dam. Transportation corridors in the project area include Highway 97A, which follows the west side of the Columbia River, and Entiat River Road, which follows the north and east sides of the river. Limited access is provided to the east portion of the project area via Crum Canyon and Osburn roads.

The centerline of the project area is located adjacent to the south side of an existing transmission corridor that was initially established in the area in the early 1950s (Figure 3.1-1). The existing corridor consists of two electric transmission lines (one double circuit 345 kV line and one 500 kilovolt [kV] line) owned and operated by the Bonneville Power Administration. The double circuit 345 kV line (Chief Joseph – Snohomish Nos. 3 and 4) was built in the early 1950s. The single circuit 500 kV line (Chief Joseph – Monroe No. 1), which parallels the south side of the double circuit 345 kV line, was built in the late 1960s. These existing lines and the associated access roads are the most visible evidence of human disturbance in much of the project area, which consists of largely undeveloped lands for the most part managed by Federal and state agencies. Limited residential development has taken place along Crum Canyon and Entiat River roads, south and west of the project area.

Natural disturbances that have affected the watershed include earthquakes. Earthquake Point, located immediately north of the switchyard site proposed as part of the Proposed Action, is named for its believed association with a large earthquake occurring in 1872. Many believe the landslide that occurred here—the Ribbon Cliff slide—was a direct result of the 1872 earthquake (CCEMC no date). However, some recent investigations indicate that the landslide pre-dated the 1872 earthquake and that a younger

slide face and talus debris may be related to the earthquake. Recent minor tremors occurred in the Entiat watershed area in 1989, 1991 and 1995 (USDA Forest Service 1996).

Due to its low elevation and rain-shadowed climate, the lower Entiat watershed is prone to relatively frequent fires. A 1987 fire scar study of the Entiat Valley found that fires historically burned over a large percentage of the lower drainage every 7 to 10 years. The range of severity of prehistoric fires is not known. From 1900 up until the late 1960s, few fires grew to larger than 2,000 acres. Since 1970, the Entiat Valley has experienced six fires exceeding 2,000 acres: the Gold Ridge, Shady Pass, Entiat, Crum Canyon, Dinkleman, and Tyee fires. Collectively, these fires have burned 60 percent of the watershed, including approximately 65 percent of the project area. Aggressive fire suppression on public lands has allowed increased stocking in stands and a build-up of dead and down forest fuels. This situation may have contributed directly to the size and intensity of at least three of the six large fires since 1970.

Severe, high-intensity thunderstorms are also a common occurrence in the Entiat watershed and flooding has followed every major fire in the drainage since 1970. These floods have been the result of localized thunderstorms. In addition, significant flooding occurred in the Entiat Valley in 1948, 1956, and 1974 as a result of heavy spring rains.

Rehabilitation work following major events has also affected the watershed. Channel modifications following the major flood in 1948 dramatically changed the character of the Entiat below Brief. Large-scale, burned area rehabilitation programs have also been implemented in the areas affected by the large fires that have occurred since 1970. Channel modifications were again made in the Entiat Valley following the Crum Canyon floods in 1977.

### **Reasonably Foreseeable Future Actions**

Reasonably foreseeable future actions are defined for the purposes of this analysis as future actions that are planned within or in the immediate vicinity of the project area. Reasonably foreseeable future actions in the project area (generally defined for this analysis as the area within one mile of the Proposed Action) were identified by contacting the major land management agencies in the area, specifically the U.S. Department of Agriculture (USDA) Forest Service, U.S. Department of Interior Bureau of Land Management (BLM), Washington State Department of Natural Resources (WDNR), and Washington Department of Fish and Wildlife (WDFW), and through contacts made with the Chelan County Planning Department, as well as Chelan County Public Works and Washington Department of Transportation (WDOT). Projects are considered reasonably foreseeable in time if a plan or permit application has been filed with the county (for private lands) or they are identified as proposed or in progress by the responsible land management agency (for public lands).

Development within the proposed project area is limited because most of the land is federally or state owned and the likelihood of future development and disturbance on these lands is low. Contacts made with the BLM, WDNR, WDOT, and Chelan County Public Works did not identify any ongoing or reasonably foreseeable projects located within one mile of the Proposed Action. Reasonably foreseeable actions planned by WDFW within the project area are limited to ongoing vegetation restoration measures on nearby lands that they manage. The Proposed Action would not affect these lands.

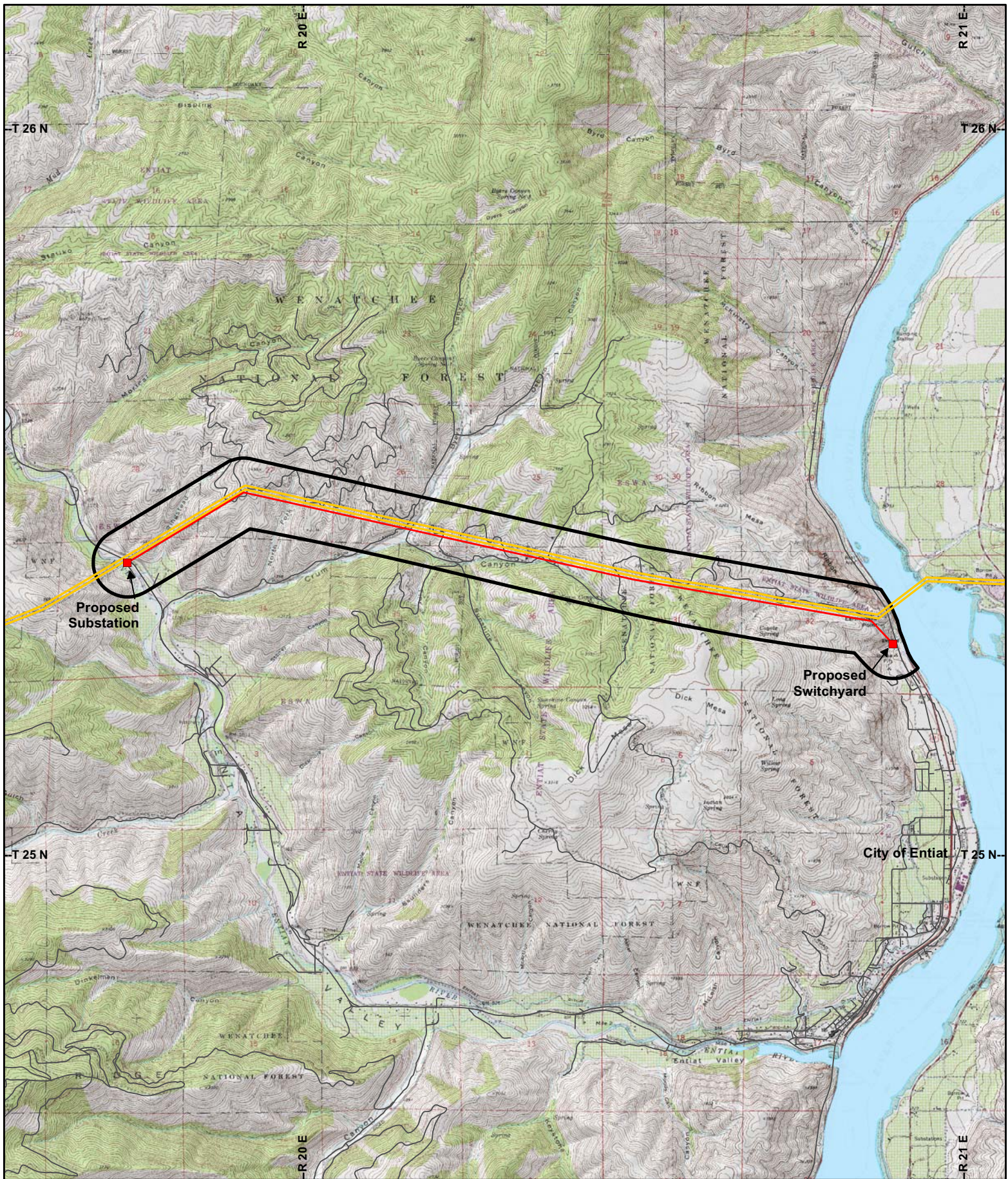
### **USDA Forest Service**

The Crum Canyon Interface Fire Hazard Reduction project on NFS lands is reasonably foreseeable and located along within 1 mile of the Proposed Action. This project involves approximately 40 acres at the interface between private and public land in the vicinity of Crum Canyon in Section 35, Township 25 North, Range 20 East. This project is being implemented in cooperation with adjacent land owners as a pilot project and is intended to create a fire tolerant forest and reduce the hazard of severe wildfire and extensive insect-caused tree mortality. The project would involve chainsaw thinning to remove the

smallest, most suppressed trees in the area, which would then be hand piled and burned. This project is expected to be completed by fall 2008. A map showing the location of this project relative to the proposed action is included in Appendix A to this document.

#### **3.1.1.2 Chelan County Planning Department**

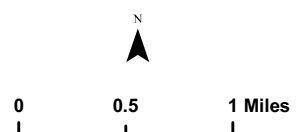
Chelan County Planning Department records indicate that a number of planning permit applications are on file for private properties located within one mile of the Proposed Action (Nelson 2007). These permit applications are mainly related to modifications to or construction of single-family residences. There are no planned residential development or commercial projects within one mile of the Proposed Action, with the exception of the ongoing Shadow Ridge housing development located south of the proposed switchyard site (Nelson 2007). The Shadow Ridge development presently includes approximately 10 single family residences and five lots located on the south side of the development that have not yet been sold (Whitehall 2008). A map showing the location of this development in relation to the Proposed Action is included in Appendix A to this document. Although the undeveloped Shadow Ridge lots are within one mile of the proposed switchyard site, based on their distance from the site, the intervening topography and vegetation, and the uncertainty regarding when and if they will be developed in the future, the likelihood that this development in combination with the Proposed Action would result in cumulative effects is low. This is discussed further by resource in the following sections.



#### Legend

- Existing BPA 345 kV and 500 kV Power Line Corridor
- Proposed Transmission Line
- Proposed Action 1/4 Mile Buffer

Figure 3.1-1 Analysis Area  
Entiat 115 kV Transmission Line Program



## **3.2 AIR QUALITY**

### **3.2.1 Affected Environment**

The following sections describe air quality regulation and standards in the project area. There were no comments made during public scoping for this project with respect to air quality.

#### **3.2.1.1 Regulation**

Air quality is regulated by the U.S. Environmental Protection Agency (EPA) under the Federal Clean Air Act. The EPA has established National Ambient Air Quality Standards to limit the concentrations and exposure duration of pollutants known to be harmful to public health. Ambient air refers to the portion of the atmosphere to which the general public is exposed. Two types of national standards exist: 1) primary standards, which are strict guidelines set in the interest of protecting public health, particularly “at risk” segments of the population, including children, elderly, and asthmatics; and 2) secondary standards, which protect public welfare interests such as decreased visibility and damage to animals and vegetation.

The EPA has designated six potentially harmful pollutants to serve as criteria for monitoring air quality: ground-level ozone (smog), carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead. The EPA has delegated authority for administering and enforcing the Clean Air Act to several states. In the state of Washington, the Washington State Department of Ecology (Ecology) is the responsible agency. The state is further subdivided into clean air agencies. Where there are no significant air quality concerns, Ecology regional offices uphold and enforce the Clean Air Act regulations. Chelan County is part of Ecology’s Central Regional Office air quality area.

#### **3.2.1.2 Air Quality Standards**

Current national and state air quality standards are identified for these “criteria” pollutants in Table 3.2-1. If the concentration of a pollutant in an area exceeds these standards, the area is designated as non-attainment. Ecology has established a network of air quality monitors throughout the state with the intent of assessing air quality in areas known to have experienced relatively high levels of pollution (i.e., metropolitan areas) (Ecology 2004). Accordingly, the number and location of monitors vary depending on current conditions (Ecology 2004).

### **3.2.2 Environmental Effects**

This section assesses the potential effects on air quality associated with the Entiat 115 kV Transmission Program. The following discussion is divided into three sections. The first section discusses the evaluation criteria used to assess the potential effects of Alternative 1 – Proposed Action. The following two sections assess the potential impacts of Alternative 1 – Proposed Action and Alternative 2 – No Action on air quality. The cumulative effects of the proposed alternatives are evaluated in Section 3.2.2.4. Direct, indirect, and cumulative effects are defined in Section 3.1 of this document.

#### **3.2.2.1 Evaluation Criteria**

Air quality impacts would be considered significant if project activities result in a widespread reduction in air quality that could pose a probable risk to human health and safety and would violate established Federal or state air quality standards. A localized reduction in air quality on a temporary basis that would not violate an air quality standard would not be considered a significant effect. Short-term air emissions due to construction operations are exempt from air quality permitting requirements.

**Table 3.2-1. National and State Air Quality Standards**

Pollutant	Averaging Times	National		Washington State
		Primary	Secondary	
Total Suspended Particles	Annual (Average)	No standard	No standard	60 $\mu\text{g}/\text{m}^3$
	24-hour	No standard	No standard	150 $\mu\text{g}/\text{m}^3$
Lead (Pb)	Quarterly Average	1.5 $\mu\text{g}/\text{m}^3$	1.5 $\mu\text{g}/\text{m}^3$	No standard
Particulate Matter ( $\text{PM}_{10}$ )	Annual (Average)	50 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$
	24-hour	150 $\mu\text{g}/\text{m}^3$	150 $\mu\text{g}/\text{m}^3$	150 $\mu\text{g}/\text{m}^3$
Particulate Matter ( $\text{PM}_{2.5}$ )	Annual (Average)	15 $\mu\text{g}/\text{m}^3$	15 $\mu\text{g}/\text{m}^3$	15 $\mu\text{g}/\text{m}^3$
	24-hour	65 $\mu\text{g}/\text{m}^3$	65 $\mu\text{g}/\text{m}^3$	65 $\mu\text{g}/\text{m}^3$
Sulfur Dioxide ( $\text{SO}_2$ )	Annual (Average)	0.03 ppm	No standard	0.02 ppm
	24-hour	0.14 ppm	No standard	0.10 ppm
	3-hour	No standard	0.5 ppm	No standard
	1-hour	No standard	No standard	0.4 ppm
Carbon Monoxide (CO)	8-hour	9 ppm	9 ppm	9 ppm
	1-hour	35 ppm	35 ppm	35 ppm
Ozone ( $\text{O}_3$ )	8-hour	0.08 ppm	0.08 ppm	No standard
	1-hour	0.12 ppm	0.12 ppm	0.12 ppm
Nitrogen Dioxide ( $\text{NO}_2$ )	Annual (Average)	0.053 ppm	0.053 ppm	0.05 ppm
Notes: $\mu\text{g}/\text{m}^3$ – micrograms per cubic meter ppm – parts per million Source: Ecology 2004				

### 3.2.2.2 Alternative 1 – Proposed Action

#### Construction Effects

A short-term reduction in local ambient air quality would occur during construction and operation under Alternative 1. Grading, earth moving, vehicle travel along unpaved roads, and structure installation could all create short-term fugitive dust emissions. The only burning that could potentially be done would be incidental burning of slash piles, which is unlikely to create much smoke. The amount of smoke would be expected to be under the tonnage that requires a permit from Washington State. Piles less than 100 tons per acre on NFS land do not require a clearance for smoke management. The Forest Service estimates that the total estimated weight of the trees to be cut as part of this project would be approximately 12.5 tons. The majority of this material would not be burned and, as a result, the estimated tonnage would be well below the threshold established by the state. Alternative 1 would have no measurable impact on air quality from the limited burning of slash piles. Analysis of particulate matter within an aerodynamic diameter of 10 micrometers and 2.5 micrometers is not necessary for the project because of the incidental nature of the smoke. Any burning of piles would comply with the Washington State Smoke Management Plan and would occur during times when unstable atmospheric conditions provide for smoke dispersal. A Slash Disposal Burn permit would be required for piles greater than 10-foot in diameter. No permit is required to burn a single 10-foot in diameter pile per day, under the Open Rule Burn. All burn piles would be limited to 10 feet in diameter, and prior to burning, personnel would check with the Washington State Fire Danger and Outdoor Burning Database (1-800-323-BURN) to ensure compliance with that day's regulations and fire dangers.

Alternative 1 would involve the use of Best Management Practices for dust control, including watering roads during construction, if necessary. Fugitive dust emissions during construction would, therefore, be less than state and Federal standards and impacts would not be significant.

Heavy equipment and vehicles used during construction and maintenance activities emit pollutants such as carbon monoxide, nitrogen oxides, sulfur oxides, particulates, and volatile hydrocarbons. Impacts associated with vehicle emissions during construction of the proposed transmission line and associated facilities are expected to be short term, thus resulting in a low impact on long-term air quality and visibility. Vehicle emissions associated with maintenance activities would be negligible.

### **Operation Effects**

During operation, transmission lines emit small amounts of ozone and nitrogen oxides. However, the amount emitted by a 115-kilovolt system would be too small to measure and would have no adverse effect on human health or the environment (BPA 2003). Alternative 1 would have no effect on ozone or nitrogen oxide.

The Clean Air Act described several classes of “airsheds” and goals for managing the air quality of those airsheds. “Class I areas” include national parks greater than 6,000 acres in size and national wilderness areas 5,000 acres in size. The Alpine Lakes Wilderness, approximately 25 miles west of the project area, is the closest Class I airshed. Potential air quality impacts to this airshed would be negligible under Alternative 1.

### **Consistency with the Wenatchee National Forest Plan**

Alternative 1 is consistent with the Forest-wide standards and guidelines that apply to the Key Deer and Elk Habitat (EW-1) and Utility Corridor (UC-1) designations on NFS lands (USDA Forest Service 1990). These standards and guidelines include the following:

- Maintain air quality at a level that is adequate for the protection and use of forest resources on the Wenatchee National Forest and meets or exceeds applicable federal and state standards and regulations
- Protect air quality related values within Class I areas, including visibility
- Manage prescribed burning to comply with the Washington State Smoke Management Plan

#### **3.2.2.3 Alternative 2 – No Action**

Alternative 2 – No Action would not involve any new construction or other activities and would therefore have no effect on air quality. Current air quality conditions in the project area would continue unaffected.

#### **3.2.2.4 Cumulative Effects**

This section considers the incremental effects of the proposed alternatives when added to other past, present, and reasonably foreseeable future actions. Past and present actions affecting resources are included in the affected environment portion of this section. This includes the operation and ongoing maintenance of the existing Bonneville Power Administration transmission lines and, as a result, the direct and indirect effects analysis assesses the potential impacts of the Proposed Action in conjunction with these existing lines. Past actions affecting air quality would no longer affect current air quality. Reasonably foreseeable future actions are defined for the purposes of this analysis as future actions that are planned within or in the immediate vicinity of the project area (defined for this analysis as the area within one mile of the Proposed Action). Projects are considered reasonably foreseeable in time if a plan or permit application has been filed with the county (for private lands) or they are identified as proposed or in progress by the responsible land management agency (for public lands).

Past actions impacting air quality would no longer have an effect on current air quality. Ongoing activities, or pre-existing sources of air pollution, in the project area include vehicular traffic on State Highway 97 Alternate and Entiat River Road, off-highway vehicle use (including over-snow vehicles), residential wood burning for heating, and periodic forest fires. Traffic-related pollution and wood stove use are likely to increase as the population increases in the area. Use of off-highway vehicles is restricted by the private landowners and public land managers in the area and is likely to remain constant or increase slightly with increased population pressure. These activities have not resulted in violations of air quality standards and are not likely to do so in the future.

The reasonably foreseeable actions included in this analysis are discussed in Section 3.1. These actions include the Crum Canyon Interface Fire Hazard Reduction project, the ongoing Shadow Ridge housing development located south of the proposed switchyard site, and planning permit applications for modifications to or construction of single-family residences within one mile of the Proposed Action. The Crum Canyon fuel management project would meet all applicable Wenatchee National Forest Land and Resource Management Plan standards and guidelines intended to protect air and would not take place at the same time as the Proposed Action. Exhaust emissions from vehicles and machinery associated with residential construction would likely result in short-term, local reductions in air quality. Considered together with these past, present, and reasonably foreseeable future actions the cumulative effect of the Proposed Action on air quality is expected to be low.

## **3.3 SOIL, WATER, AND FISH**

### **3.3.1 Affected Environment**

The following sections provide a general overview of the soil and water resources within the analysis area and describe analysis area soil and water characteristics. The analysis area for these resources includes the area within one-quarter mile of the proposed transmission line route (Figure 3.1-1).

Comments during public scoping for this project identified the following issue with respect to geologic conditions:

- Building the proposed switchyard in an area subject to rock slides could present a number of problems, including an increased risk of wildfire

#### **3.3.1.1 Geologic and Geomorphic Setting**

The general project area lies in Chelan County between the eastern slopes of the North Cascade Mountains and the Columbia Plateau. Climate in the project area is strongly influenced by the Cascade Mountains to the west. Annual precipitation across the project area ranges from less than 10 inches along the Columbia River near Entiat to over 20 inches in the upper elevations. Heavy rains, especially on melting snow, may lead to flash floods in the small drainages throughout the area. Approximately 50 percent of the mean annual precipitation falls from October through January, and 75 percent falls from October through March. Cumulative snow depths are approximately 24 inches in the lower Entiat Valley (CCCD 2004).

The geology of the area consists of granitoid rocks of the Entiat pluton extending along the Entiat Mountains from the Columbia River to the headwaters of the Entiat River (Tabor et al. 1987). The bedrock may outcrop or be covered by more recent volcanics (ash and pumice), loess, and sediments derived from the parent rock in place. Outcrops of Columbia River basalt are present on the eastern slopes of the project area and at Dick Mesa, just south of the project area.

Earthquake Point, located immediately north of the proposed switchyard site, is named for its believed association with a large earthquake occurring in 1872. Many believe the landslide that occurred here—the Ribbon Cliff slide—was a direct result of the 1872 earthquake. This earthquake (the 1872 North Cascades Earthquake) is the largest recorded in Washington State and resulted in landslides throughout the region (CCEMC no date). However, some recent investigations indicate that the landslide pre-dated the 1872 earthquake and that a younger slide face and talus debris may be related to the quake. Recent minor tremors have occurred in the Entiat watershed area in 1989, 1991, and 1995 (USDA Forest Service 1996).

#### **3.3.1.2 Soil**

Soils in the analysis area are generally highly erodible due to widespread deposits of volcanic ash and pumice or loess at the surface. Sediment delivery rates are typically high, primarily as a result of soil properties and steep slopes. Flooding and debris flows are significant transport processes for both sediment and organic material. Management disturbances such as grazing, tractor yarding, and roading generally accelerate natural erosion and sediment delivery hazards on sensitive soils. Once fine-textured soils at the surface are disturbed, certain climatic conditions and coarse-textured sub-soils can create an environment that limits the amount of soil moisture available for vegetative growth (CCCD 2004).

The following descriptions of current soil conditions within the analysis area are based on 1:24,000-scale soil maps. The Natural Resource Conservation Service (NRCS, formerly the USDA Soil Conservation

Service) has mapped soil characteristics and published soil surveys of the analysis area. Parts of the analysis area are included in two different soil surveys:

- Soil Survey of Cashmere Mountain Area, Washington, Parts of Chelan and Okanogan Counties (NRCS 2007)
- Soil Survey of Chelan Area, Washington, Parts of Chelan and Kittitas Counties (NRCS 2007)

In mapping these soils, the agency soil scientists considered localized variability and grouped soils with similar characteristics and similar responses to disturbances into soil units. With some exceptions, most of the analysis area consists of soils derived from the breakdown of underlying bedrock, generally granite and granodiorite, and variably mixed with volcanic ash and/or loess deposits. Alluvial and glacial deposits may be found on alluvial fans and terraces. Alluvial fan sediments consist of weathered igneous rock derived from upslope materials.

### Soil Erosion

Soil erosion potential throughout the analysis area is generally high. The NRCS provides soil suitability and limitations for various uses, including building site development, land management, vegetative productivity, and other uses. Land management use categories are further divided, including haul roads and log landings, on- and off-road road and trail erosion, soil rutting hazard, and others. The NRCS Erosion Hazard Potential for unsurfaced road and trail use was selected for this discussion and is displayed for the soils within one-quarter mile of the Proposed Action in Table 3.3-1. While this use rating was developed to indicate the relative soil loss hazard from unsurfaced roads and trails, it is useful in this analysis as it provides an area-wide rating of erosion hazard related to similar activities. The ratings are based on soil erosion factor K, slope, and content of rock fragments. Soil erosion factor K represents the susceptibility of soil to sheet and rill erosion based on physical characteristics of the soil and is based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity.

The erosion hazard potential is described as slight, moderate, or severe. A rating of slight indicates that little or no erosion is likely; moderate indicates that some erosion is likely, that roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and severe indicates that significant erosion could be expected, that the roads or trails require frequent maintenance, and that erosion-control measures or mitigation are needed for unsurfaced roads and trails (NRCS 2007).

**Table 3.3-1. Area and Extent of Potential Soil Erosion in the Analysis Area**

Soil Erosion Potential	Area (acres)	Extent (%)
Slight	51	3%
Moderate	28	1%
Severe	1,850	94%
Unrated <sup>1/</sup>	30	2%
<b>Total</b>	<b>1,958</b>	<b>100%</b>
Notes: 1/Some areas are unrated for soil erosion potential because soil compaction potential is too variable over a small distance, data are unavailable, or the concept of soil erosion potential does not apply. These areas include gravel pits and waterbodies. Source: NRCS 2007		

### Soil Compaction

Detrimental soil compaction can contribute to soil erosion and reduced soil productivity. In general, the finer the soil, or the more organic matter in the soil, the more likely it will be compacted as a result of weight being placed on the soil. Soil compaction occurs when soil particles are pressed together,

reducing the pore space between them. Soil compaction increases the weight of solids per unit of volume of soil (bulk density). Soil compaction occurs in response to pressure exerted by field machinery or animals. The risk for soil compaction is greatest when soils are wet. Compacted soil usually allows less water to infiltrate, resulting in greater overland flow of water for longer periods of time. The overland flow has greater energy to detach and transport soil particles, resulting in increased soil erosion. Soil compaction has the potential to affect the long-term productivity of a site. In general, finer-grained soils can withstand less soil compaction than coarse-grained soils before rooting restrictions occur (NRCS 1996).

Estimated soil compaction potential for the soil types present in the analysis area is summarized in Table 3.3-2. Areas with low soil compaction potential make up 23 percent of the analysis area. Only 4 percent of the analysis area has high soil compaction potential. The remaining 69 percent of the analysis area has medium potential for soil compaction.

**Table 3.3-2. Area and Extent of Potential Soil Compaction in the Analysis Area**

Soil Compaction Potential <sup>1/</sup>	Area (acres)	Extent (%)
Low	459	23%
Medium	1,355	69%
High	72	4%
Unrated <sup>2/</sup>	72	4%
<b>Total</b>	<b>1,958</b>	<b>100%</b>
Notes: 1/Soil compaction potential is rated according to the following: Low = gravels and sands to loamy sands, Medium = sandy loams to loams, High = silt loams and finer soil textures. Percent of larger particles (gravel, cobbles, etc.) was not accounted for in these areas. 2/Some areas are unrated for soil compaction potential because soil compaction potential is too variable over a small distance, data are unavailable, or the concept of soil compaction potential does not apply. These areas include bedrock outcrops and waterbodies. Source: NRCS 2007		

### 3.3.1.3 Water

#### Surface Water

All drainages crossed by the proposed transmission line corridor eventually flow to the mainstem Columbia River. Minor drainages in the east portion of the proposed corridor drain directly to the Columbia River. Drainages in the west portion of the analysis area tend to drain to the Entiat River. Besides the Columbia and Entiat rivers, there are no permanent flowing rivers or streams within the analysis area. Numerous small drainages may host intermittent streams that flow in response to heavy precipitation, snow melt, or a combination of both. Several named and unnamed springs occur in Crum and Byers canyons.

The largest of these drainages is Crum Canyon. While Crum Canyon does not host a perennial stream, it has experienced large flood events. Two floods that occurred in 1977 were post-fire responses to short duration, high intensity convective storms. The first flood, with an estimated runoff of 5,050 cubic feet per second (cfs), occurred in mid-June. The second flood occurred shortly afterward in late July with nearly the same runoff (CCCD 2004). Annually, the average annual runoff is less than 10 inches, decreasing eastward to less than 1 inch along the Columbia River (USGS 1994).

Review of the daily mean flows of the Entiat River indicates that peak runoff begins in April, peaks May through June, and tapers off into the fall.

The flood of record on the Entiat River occurred in 1948 (approximately 10,800 cfs). Other large floods occurred in 1894, 1972, twice in 1977, and in 1989 following wildfire events (CCCD 2004).

## **Groundwater**

Groundwater is not a major resource within the analysis area. Groundwater is primarily stored in the alluvial sediments of the valley floors and supplements summer flows of the Entiat River (CCCD 2004). Discharge from the aquifers is by evapotranspiration, leakage to adjacent aquifers, withdrawals from wells, movement of water to surface-water bodies, and discharge from springs (USGS 1994).

The minor aquifers within the analysis area are in the pre-Miocene rocks and generally yield little water to wells. The thickness of these igneous and metamorphic rocks is unknown. East of the Cascade Range, the aquifers in pre-Miocene rocks generally yield freshwater but may yield saltwater in places (USGS 1994).

## **Water Quality**

Section 303(d) of the Federal Clean Water Act requires Washington State to periodically prepare a list of all surface waters in the state for which beneficial uses, such as drinking, recreation, aquatic habitat, and industrial use, are impaired by pollutants. This list encompasses water quality limited estuaries, lakes, and streams that fall short of state surface water quality standards, and are not expected to improve within the next two years (Ecology 2007). Review of the approved 303(d) list for 2004 indicates that there are no listed waters within the analysis area. The Entiat River is listed for pH near its confluence with the Columbia River.

### **3.3.1.4 Fish**

The project area is located mainly within the Ribbon Mesa and Crum Canyon drainages. The Ribbon Mesa area contains several minor draws that drain towards the mainstem Columbia River. These draws are essentially dry at most times of the year and are not fish bearing. Crum Canyon is an intermittent tributary to the Entiat River with its confluence near River Mile (RM) 8. Crum Canyon is neither fish-bearing nor potentially fish-bearing due to its irregular and intermittent flow.

The following endangered and threatened fish species exist within downstream reaches of the Entiat River:

- Upper Columbia River spring Chinook salmon (*Oncorhynchus tshawytscha*), listed as Endangered on March 24, 1999 (listing re-affirmed on June 28, 2005)
- Upper Columbia River steelhead (*O. mykiss*), reinstated as Endangered on June 13, 2007
- Upper Columbia River bull trout (*Salvelinus confluentus*), listed as Threatened on June 10, 1998

Critical habitat for Upper Columbia River spring Chinook salmon and upper Columbia River Steelhead was designated on September 2, 2005 (70 Federal Register 52631) for the Entiat River. Critical habitat has been neither proposed nor designated for bull trout within Upper Columbia River Basin – Unit 21, which includes the Entiat River. The Entiat River provides Essential Fish Habitat (EFH) (as defined under the Magnuson-Stevens Act) for coho and Chinook salmon.

### **Upper Columbia River Spring Chinook Salmon**

Adult upper Columbia River spring Chinook salmon enter the Entiat River Basin in May. Spawning occurs in very late July through September, with the peak occurring in middle to late August. Hamstreet (2006) indicate that spawning occurs in the mid to upper Entiat River from RM 16 to 28 and Mad River (RM 1.5 to 5). Chinook fry emerge from March to April and utilize nearshore areas within and behind large woody debris, undercut tree roots, and other cover. Spring Chinook are known to rear in the Entiat

River, from the mouth upstream to Entiat Falls (RM 34). Rearing in freshwater generally occurs over about one year, with smolts (downstream migrating juveniles) beginning migration to the ocean in March.

### **Upper Columbia River Steelhead**

Adult Steelhead, migrate into the Columbia River in the late summer and early fall, and typically move into the Entiat River by November. However, some adults hold in the mainstem Columbia River until February or March before moving into natal streams to spawn from March to the end of May (English et al, 2001). Steelhead, spawn in the Entiat River from RM 0.7 (upstream of the slack water from the Columbia River) to the Fox Creek spawning channel at RM 28. Fry emerge in July through September, and juvenile steelhead generally spend one to three years rearing in freshwater before migrating to the ocean. Steelhead are known to rear in the Entiat River, from the mouth upstream to Entiat Falls (RM 34).

### **Columbia River Bull Trout**

Bull trout are known to occur in the Entiat River from the mouth to Entiat Falls at RM 34. Bull trout within the Entiat drainage exhibit both fluvial migratory and resident life history strategies. Study results indicate that the majority of bull trout passing Rocky Reach Dam on the Columbia River (approximately 10 miles south of the confluence of the Columbia and Entiat rivers) are destined for the Entiat river system (BioAnalysts 2004). The majority of fluvial bull trout migrate past the dam and up the Entiat/Mad Rivers from April through June. Bull trout spawning within the Entiat River occurs from late-September through early November from Box Canyon (RM 29) to Entiat Falls (RM 34). Based on telemetry data from a fixed telemetry receiver station located at RM 3.5, adult bull trout migrate downstream after spawning from late-September to early December, with a peak in mid-October (USFWS 2001-2006). No bull trout redds have been observed within the lower eight miles of the Entiat River. Juvenile bull trout use the lower Entiat River for rearing, however in low numbers. Snorkel surveys, conducted to determine the effectiveness of in-stream restoration projects in the lower Entiat River, encountered very few bull trout (Nelle 2006).

### **Entiat River Habitat**

The habitat in the lower Entiat River (from RM 16.2 to the mainstem Columbia) was evaluated in the Entiat Subbasin Plan (Northwest Power and Conservation Council [NPCC] 2004). General characteristics of this reach include the following:

- Much of the land adjacent to the river is privately owned. Land use includes irrigated orchards and pasture.
- The primary tributary to the lower Entiat River is the Mad River which enters near RM 10.0. Several smaller tributaries also flow into the Entiat River within the lower 16 miles, including Potato, Mud, and Roaring creeks.
- Riparian zones and upland conditions have been altered by timber harvest, fire suppression, and livestock grazing.
- Much of the mainstem has been altered due to channelization and flood control measures.
- Natural disturbances have included wildfire, flooding, earthquakes, landslides, glaciation, and volcanic eruptions.
- Road construction, residential and agricultural development in the riparian zone has reduced or eliminated vegetation and reduced the supply of large woody debris.
- Soils are highly erodible and sediment deposition is a dominant natural process in the lower Entiat River reach.

### **3.3.2 Environmental Effects**

#### **3.3.2.1 Evaluation Criteria**

Potential effects to soils (soil erosion and compaction potential) are evaluated based on estimates of the acres that would be disturbed under each alternative. Estimated disturbance areas include the work areas required for transmission structure installation, the impacts of temporary access trails, the proposed substation and switchyard sites, and the laydown areas necessary to store equipment, materials, and supplies during construction. Potential soil erosion impacts would be considered high if the alternative involves disturbance on soils rated for soil erosion as “Severe” within 300 feet of a stream, or in areas that would deliver eroded material to surface waters. Potential soil compaction impacts would be considered significant if there is a reasonable likelihood of encountering highly compactable soils during construction.

Hydrology and water quality effects are evaluated with respect to affected waterbodies, effects to surface water from sedimentation, conversion of land to impervious surfaces, flood hazard, and impacts to impaired waters. Impacts to fish would be considered significant if there were likely to be substantial adverse impacts to fish listed under the Endangered Species Act (ESA) or EFH as regulated under the Magnuson-Stevens Act.

Implicit in the evaluation is that risks to soil, water, and fish resources analyzed by alternative would be mitigated by the measures listed in Section 2.5.4.

#### **3.3.2.2 Alternative 1 – Proposed Action**

##### **Soils**

In the broadest sense, soil erosion occurred in the analysis area naturally prior to human settlement and continues to occur from both natural and human causes throughout the valley. Soil compaction is a more recent phenomenon that occurs from human activities on the land (USDA Forest Service 1999b). The key soil characteristics related to the proposed alternatives are potential soil erosion and potential soil compaction as a function of existing physical characteristics of the soil.

##### ***Soil Erosion***

The risks associated with soil erosion are a decrease in soil productivity and delivery of eroded material as sediment to surface waters. Acreage of disturbance, types of disturbance, and mitigation used would affect short-term (less than 10 years) erosion potential. If a disturbed area is not revegetated, its risk of erosion and delivery of sediment to nearby surface waters remains higher than the risk in vegetated areas in the long term because plant roots and leaves protect and hold soils in place. Soil loss can retard vegetation growth that is essential for soil stabilization.

Alternative 1 would disturb approximately 8.3 acres of soil during the installation of approximately 29 transmission line structures, the switchyard and substation, and associated temporary access trails and laydown areas (Table 3.3-3). The proposed structures and temporary access trails would likely be entirely located on soils with severe potential soil erosion ratings (based on unsurfaced road and trail use ratings), affecting approximately 2 acres. Vegetation clearing within the proposed switchyard and the three laydown areas would also likely be entirely or primarily located on soils with severe potential soil erosion ratings (based on unsurfaced road and trail use ratings) and would affect approximately 4.5 acres. The proposed substation would likely be located on soils with slight (0.1 acre) and moderate (1.4 acres) soil erosion potential ratings (Table 3.3-3).

None of the potential impacts on soils with severe soil erosion potential would be located within 300 feet of a stream. Potential impacts associated with disturbance to soils within 300 feet of small drainages that

may host intermittent streams that flow in response to heavy precipitation or snow melt or both would be minimized by the implementation of the mitigation measures identified in Section 2.5.4. These measures would apply to all soils disturbed as a result of Alternative 1. Measures identified in Section 2.5.4 include development and implementation of a Stormwater Pollution Prevention (SWPP) Plan, the use of silt fencing and mulch in locations where heavy travel and disturbance would occur. Structures on steep slopes that are difficult to reach by trail or road would be accessed by helicopter and installed by hand crews. As a result, there would be no significant direct impacts to soils in the analysis area in the form of erosion, or to streams in the form of sediment delivery.

**Table 3.3-3. Soil Erosion Potential by Project Component (acres)**

<b>Component/Erosion Potential<sup>1/</sup></b>	<b>Slight</b>	<b>Moderate</b>	<b>Severe</b>	<b>Unrated<sup>2/</sup></b>	<b>Total</b>
Structures	0.0	0.0	0.3	0.0	0.3
Trails	0.0	0.0	1.7	0.0	1.7
Switchyard	0.0	0.0	1.7	0.3	2.0
Substation	0.1	1.4	0.0	0.0	1.6
Laydown Areas <sup>3/</sup>	0.0	0.0	2.8	0.0	2.8
<b>Total<sup>4/</sup></b>	<b>0.1</b>	<b>1.4</b>	<b>6.5</b>	<b>0.3</b>	<b>8.3</b>

Notes:

ROW – right-of-way

1/Soil erosion potential is rated based on soil erosion factor K, slope, and content of rock fragments. The hazard is described as "slight," "moderate," or "severe." These ratings are based on the potential risk from unsurfaced road and trail use.

2/Some areas are unrated for soil erosion potential because the data are too variable over a small distance, data are unavailable, or the concept of soil erosion potential does not apply. These areas include gravel pits and waterbodies.

3/The three laydown areas are located in areas that have been heavily disturbed in the past. For the purposes of analysis, it is assumed that all the soil in these areas would be disturbed. This contrasts with the approach used to assess soil compaction, which assumes that only half of these areas include vegetation that would be disturbed as part of this project.

4/Limited vegetative clearing within the transmission ROW would not involve removal of effective ground cover or the use of vehicles or heavy equipment in off-road (or off-trail) locations. As such, this activity is not expected to pose a soil erosion risk and is not included in this summary of impacts.

Source: NRCS 2007

Potential indirect effects to soil erosion could result from off-highway vehicle (OHV) use and unauthorized use of non-paved, project trails during rain storms. Recreational use of lands that allow for off-road vehicular travel can increase surface erosion and compaction of soils (Webb and Wilshire 1983; Soane et al. 1980/81; Sheridan 1979; Voorhees et al. 1978). Use of vehicles on non-paved roads, especially during high precipitation events, can also increase erosion and sediment production from the road surface (Reid and Dunne 1984). However, all temporary access trails used for this project would be removed following construction, with the trail surface recontoured to the original grade and rehabilitated. Access would also be controlled during construction with signs discouraging unauthorized use of the temporary access trails. Potential indirect effects are, therefore, not expected to be significant.

### ***Soil Compaction***

While there is no risk of soil compaction where the disturbance is located on bedrock outcrops, elsewhere the volcanic ash layer common throughout the analysis area makes these soils particularly susceptible to soil compaction.

To evaluate the potential for soil compaction as a result of project disturbances, hazard values were assigned to the affected soil types based on soil characteristics (see Table 3.3-4, note 1). No high risk soils would be affected by project construction. Approximately 60 percent of the disturbance associated with structure installation and temporary trail use would likely occur on soils with medium soil compaction potential. Approximately 81 percent and 97 percent of the disturbance associated with

switchyard and substation construction, respectively, would occur on soils with medium soil compaction potential. Disturbance associated with the three proposed laydown areas would likely occur entirely on soils with medium soil compaction potential. The remaining disturbance associated with these project components would likely occur on soils with low soil compaction potential or unrated land.

**Table 3.3-4. Soil Compaction Potential by Project Component (acres)**

<b>Component/Compaction Potential<sup>1/</sup></b>	<b>Low</b>	<b>Medium</b>	<b>Unrated<sup>2/</sup></b>	<b>Total</b>
Structures	0.1	0.2	0.0	0.3
Trails	0.7	1.0	0.0	1.7
Switchyard	0.1	1.6	0.3	2.0
Substation	0.0	1.5	0.0	1.5
Laydown Areas <sup>3/</sup>	0.0	1.4	0.0	1.4
<b>Total<sup>4/</sup></b>	<b>0.9</b>	<b>5.7</b>	<b>0.3</b>	<b>6.9</b>
Notes: ROW – right-of-way 1/Soil compaction potential is rated according to the following: Low = gravels and sands to loamy sands, Medium = sandy loams to loams, High = silt loams and finer soil textures. Percent of larger particles (gravel, cobbles, etc.) was not accounted for in these areas. 2/Some areas are unrated for soil compaction potential because the data are too variable over a small distance, data are unavailable, or the concept of soil compaction potential does not apply. These areas include gravel pits and waterbodies. 3/The three laydown areas are located in areas that have been heavily disturbed and compacted in the past. For the purposes of analysis, it is assumed that half of the soil in these areas (1.4 acres) is already compacted, with the remaining half (1.4 acres) susceptible to compaction. This contrasts with the approach used to assess soil erosion, which assumes that all of the soil in these areas would be susceptible to erosion. 4/Limited vegetative clearing within the transmission ROW would not involve removal of effective ground cover or the use of vehicles or heavy equipment in off-road (or off-trail) locations. As such, this activity is not expected to pose a soil compaction risk and is not included in this summary of impacts. Source: NRCS 2007				

The mitigation measures in Section 2.5.4 would be followed under Alternative 1. Where winter snowpack covers any existing roads, temporary access trails, or construction areas, a no-construction-activity period would be required following snow melt to allow for adequate drainage and soil stabilization. The length of this period would be based on site-specific conditions and determined by the Construction/Environmental Inspector assigned to the project (see Section 2.5.4). With the proposed mitigation measures in place, direct impacts to soil compaction are not expected to be significant.

Potential indirect effects to soil compaction could result from OHV use. As noted in the preceding section, recreational use of lands that allow for off-road vehicular travel can increase surface erosion and compaction of soils. However, all temporary access trails would be removed following construction, with the trail surface recontoured to the original grade and revegetated. Access would also be controlled during construction with signs discouraging unauthorized use of the temporary access trails. Potential indirect effects to soil compaction are, therefore, not expected to be significant.

### ***Consistency with the Wenatchee National Forest Plan***

The Forest-wide Standards and Guidelines that apply to the EW-1 (Key Deer and Elk Habitat) and UC-1 (Utility Corridors) designations on NFS lands include standards and guidelines to maintain or enhance the productive properties of the soil resource (USDA Forest Service 1990). Alternative 1 is consistent with the standards and guidelines that are applicable to this project, as discussed below. Measures to reduce or eliminate impacts to the productive properties of the soil resource are identified in Section 2.5.4.

**Compaction, Displacement, Puddling, and Severe Burning** – Alternative 1 is consistent with this standard which requires that the total acreage of detrimental soil conditions, including detrimental compaction, not

exceed 20 percent of the total acreage within the activity area, including landings and system roads. Under Alternative 1, approximately 5.7 acres of soil with medium compaction potential would potentially be disturbed (Table 3.3-4). This represents approximately 6 percent of the activity area defined as the proposed transmission line ROW, trail roads, substation and switchyard sites, and laydown areas.

Surface Erosion – Alternative 1 is consistent with the minimum percent effective ground cover requirements identified in the Wenatchee National Forest Land and Resource Management Plan (Forest Plan) (USDA Forest Service 1990, IV-97, Table IV-20). Effective ground cover on disturbed soils with severe erosion potential (approximately 6.5 acres) would be 45 to 60 percent after one year, and 60 to 75 percent after two years. These percentages would be estimated based on site capabilities and would not, for example, necessarily represent 45 to 60 percent of the entire area. Disturbed soils with slight (0.1 acre) and moderate (1.4 acre) erosion potential would also meet the applicable minimum effective ground cover requirements.

Mass Wasting – No active mass wasting sites would be disturbed by Alternative 1. Structures placed on the steep slopes near the Ribbon Cliff landslide would be delivered by helicopter and installed by hand crews.

Roads and Landings – Alternative 1 is consistent with the Forest Plan requirement that closed roads, temporary roads, and landings should be placed in conditions to minimize soil erosion (see Section 2.5.4). All temporary access trails would be decommissioned and rehabilitated following construction, as would the parts of the laydown areas that would be newly disturbed under this alternative.

Surface Water and Roads – Surface water on roads and road-related facilities would be controlled. No new roads would be constructed and temporary access trails would be decommissioned and rehabilitated following construction. A SWPP Plan would be developed and implemented as part of the mitigation for this alternative (Section 2.5.4).

## **Land and Rock Slides**

Comments received during project scoping expressed concern about the potential risk associated with locating the switchyard in an area prone to rock slides. The Ribbon Cliffs slide is believed to have occurred as a result of a major regional earthquake in 1872, resulting in the present landform. The proposed switchyard would be situated approximately 100 feet south of the base of the steep, rocky slopes of Ribbon Cliff. The site was inspected by the Public Utility District No. 1 of Chelan County and HDR Engineering, a transmission line engineering firm, during initial site evaluations and during ongoing design work. No evidence of material from the cliff that would be likely to cause significant damage was observed on or in the immediate vicinity of the proposed switchyard site. To reduce the potential risk of project-related land and rock slides, structures located on the steep, rocky terrain would be delivered by helicopter and installed by hand crews. Rock barriers would be placed at the foot of the slope to buffer and protect the switchyard and equipment from falling rocks.

## **Water**

### ***Surface Water***

The proposed transmission line would not cross any perennial streams or waterbodies; however, intermittent streams occupying the affected drainages do transport sediment when flowing, especially during flood events. Sediments created by project-related erosion could ultimately reach the Entiat River. However, as discussed above, impacts associated with soil disturbance and erosion would be short-term and the potential significance of these impacts would be eliminated or reduced by the implementation of the mitigation measures identified in Section 2.5.4. Therefore, there would be no significant impacts to

streams in the analysis area resulting from sedimentation. Without sediment delivery, no increases in turbidity are predicted.

The permanent conversion of land to impermeable surface as a result of construction of the substation and switchyard would be insignificant at the watershed scale. The switchyard and substation sites, as proposed, would occupy 2.0 and 1.5 acres, respectively. For comparison, the entire Entiat watershed is approximately 305,641 acres (NPCC 2004). With the implementation of the proposed mitigation measures, including revegetation and temporary access trail abandonment, there would be no measurable effect on runoff volumes or response time or increases in the risk of flooding in Crum Canyon or the Entiat River. Part of the proposed substation site and existing access road that borders the site to the west are located within 200 feet of the Entiat River, but outside of the floodplain.

As stated in Section 3.3.1.3, there are no 303(d) listed waterbodies within the analysis area. The nearest listed waterbody is the Entiat River, listed for pH, near its confluence with the Columbia River. The project would not affect the pH in the Entiat River.

### ***Groundwater***

As discussed in the preceding Affected Environment discussion, groundwater resources are limited in the analysis area. Minimal excavation would be required for transmission structure installation and construction of the switchyard and substation. The small excavation footprint, along with the proposed mitigation measures, suggest that construction and operation of the project components would not be likely to alter the flow of groundwater to local springs or wetland areas, interrupt or degrade groundwater used for private or municipal purposes, or result in either short- or long-term violation of Federal or state agency numerical water quality standards or water quality objectives.

### ***Chemical Contamination of Soil and Water***

There is a potential for contamination of soil and water during project construction and operations because fuel, oil, or other hazardous materials would be used and stored on-site. An inadvertent release (spill) of fuel, oil, or hazardous materials could contaminate soil or water resources. This risk would be mitigated for by preparing and following project mitigation measures and a site-specific Spill Prevention Control and Countermeasures (SPCC) plan would be developed. The SPCC plan would identify the hazardous materials that would be used on site, and identify measures to prevent inadvertent releases, as well as response procedures to minimize impacts should a spill occur. As such, there would not likely be significant adverse impacts from chemical contamination of soil or water.

### ***Consistency with the Wenatchee National Forest Plan***

The Forest-wide Standards and Guidelines that apply to the EW-1 and UC-1 designations on NFS lands include guidelines to ensure the protection of water quality, quantity and timing of flows (USDA Forest Service 1990). Alternative 1 is consistent with the Forest-wide standards and guidelines that are applicable to this project and require that Best Management Practices (BMPs) are selected and designed based on site-specific conditions, implemented and enforced, and that monitoring is employed to determine that BMPs are correctly designed as applied. Water-related mitigation measures are presented in Section 2.5.5 of this document.

The Entiat River watershed is identified as a tier 1 key watershed in the Northwest Forest Plan. There would be no net increase in roads as a result of the Proposed Action. Temporary access trails used for this project would be removed following construction, with the trail surface recontoured to the original grade and rehabilitated.

## **Fish**

Project activities within the Ribbon Mesa area would have no effect on ESA-listed species in the mainstem Columbia River due to the lack of appropriate habitat conditions within draws and the location of project activities on the west side of State Highway 97 Alternate.

Project activities in the Crum Canyon drainage are also unlikely to affect ESA-listed species because the project would not require any in-water work and no riparian vegetation would be removed along Crum Canyon or the Entiat River. Alternative 1 would disturb approximately 8.3 acres during construction (Table 3.3-3). This disturbance would be associated with the proposed transmission line structures, limited right-of-way clearing, temporary access trails, the proposed switchyard and substation, and temporary work laydown areas. Approximately 6.5 acres of this disturbance would occur on soils with severe erosion potential (Table 3.3-3). Disturbance in the vicinity of Crum Canyon would be limited, with the closest structure- and trail-related disturbance located more than 100 feet from the canyon.

Sediments created by project related erosion could ultimately reach the Entiat River. However, as discussed above, impacts associated with soil disturbance and erosion would be short-term and the potential significance of these impacts would be eliminated or reduced by the implementation of the mitigation measures identified in Section 2.5.4.

The Magnuson-Stevens Act requires all fishery management councils to describe and identify EFH for each managed fishery. The Pacific Fishery Management Council has identified EFH for Pacific salmon species, which includes streams, lakes, ponds, wetlands, and other currently viable water bodies and most of the habitat historically accessible to salmon. The Entiat River provides EFH for coho and Chinook salmon. No adverse modification to EFH within the Entiat River is expected under this alternative.

### ***Northwest Forest Plan***

The Wenatchee National Forest Plan incorporates amendments made by the Record of Decision for the Northwest Forest Plan (NWFP), which applies to a portion of the NFS lands within the project area (USDA Forest Service and BLM 1994). These lands are designated Matrix and Riparian Reserves in the NWFP (USDA Forest Service and BLM 1994). Matrix lands are those not allocated to the six categories of designated areas identified in the NWFP. Matrix with suitable forestlands is managed for timber harvest and silvicultural activities unless restricted by designation in the Forest Plan.

Riparian Reserves consist of lands along streams, ponds, wetlands, and unstable or potentially unstable areas where special standards and guidelines direct land use. These overlay other allocations and are managed to benefit riparian ecosystems and riparian dependent resources. They are a key element of the NWFP Aquatic Conservation Strategy designed to restore and maintain the health of watersheds and aquatic ecosystems. Within the Crum Canyon sub-watershed, Riparian Reserve widths are set at 100 feet due to the intermittent and seasonally flowing nature of these streams. Riparian reserves overlay all other allocations and are therefore not mapped separately from the other NWFP allocations. Acreages have not been calculated for Riparian Reserves. Project activities associated with the Entiat Valley Transmission Line are located outside the Riparian Reserves of Crum Canyon and its tributaries and there would, therefore, be no impact to any of the nine Aquatic Conservation Strategy objectives under Alternative 1.

#### **3.3.2.3 Alternative 2 – No Action**

Alternative 2 – No Action would not involve any new construction or ground disturbance and would, therefore, have no direct or indirect effect on soil, water, or fish resources and the existing conditions described in the Affected Environment part of this section, including those associated with the Bonneville Power Administration's (BPA's) operation and maintenance of the existing BPA transmission lines, would continue unaffected.

#### **3.3.2.4 Cumulative Effects**

This section considers the incremental effects of the proposed alternatives when added to other past, present, and reasonably foreseeable future actions. Past and present actions affecting resources are included in the affected environment portion of this section. This includes the operation and ongoing maintenance of the existing BPA transmission lines and, as a result, the direct and indirect effects analysis assesses the potential impacts of the Proposed Action in conjunction with these existing lines.

Reasonably foreseeable future actions are defined for the purposes of this analysis as future actions that are planned within or in the immediate vicinity of the project area (defined for this analysis as the area within one mile of the Proposed Action). Projects are considered reasonably foreseeable in time if a plan or permit application has been filed with the county (for private lands) or they are identified as proposed or in progress by the responsible land management agency (for public lands).

The reasonably foreseeable actions included in this analysis are discussed in Section 3.1. These actions include the Crum Canyon Interface Fire Hazard Reduction project, the ongoing Shadow Ridge housing development located south of the proposed switchyard site, and planning permit applications for modifications to or construction of single-family residences within one mile of the Proposed Action.

The Crum Canyon fuel hazard reduction project is unlikely to have substantial effects on soil, water, or fish because the project would involve removing small trees in the area by chainsaw and then hand piling and burning them. These actions are unlikely to cause soil disturbance or compaction and would be conducted in accordance with applicable Forest Plan standards and guidelines.

Residential construction projects in the general vicinity of the analysis area would permanently impact soils, which would be heavily compacted, excavated, and paved and would no longer be available for non-urban uses. Given the distance of these potential developments from the Proposed Action and the small areas involved relative to the entire Entiat Watershed, as well as the uncertain timing of these developments, the potential for these activities combined with the Proposed Action to result in cumulative impacts to soil, water, and fish resources is low.

Overall, considered together with these past, present, and reasonably foreseeable future actions the cumulative effect of the Proposed Action on soil, water, and fish resources is expected to be low.

## 3.4 VEGETATION

### 3.4.1 Affected Environment

The following sections present a general overview of vegetation, noxious weeds, and rare plants within the proposed analysis area. The analysis area for the purposes of this discussion includes the area within one-quarter mile of the Proposed Action (Figure 3.1-1).

Comments made by the public and government agencies during public scoping for this project identified the following issues with respect to vegetation:

- Construction activities have the potential to increase the abundance and/or diversity of noxious weeds.
- Construction and maintenance of the proposed transmission line would require the removal of conifers and could result in reduced forest canopy in the affected area.

#### 3.4.1.1 Field Surveys

Field surveys of the proposed transmission line corridor and associated facilities were conducted in 2007 (Hamer Environmental 2007). The surveys were conducted along the proposed transmission line right-of-way (ROW) and at the proposed switchyard site. Surveys were also conducted along the locations of the proposed temporary access trails that would extend from existing Bonneville Power Administration (BPA) access roads to the proposed structure locations. These areas are identified as the project corridor in the following discussion of the survey results.

The existing National Forest System (NFS) and BPA access roads within the immediate vicinity of the proposed transmission line corridor were also surveyed. These areas are referred to as outside the project corridor in the following discussion. All surveys utilized an intuitive control methodology, as described in the survey protocols established by the U.S. Department of Agriculture (USDA) Forest Service (Whiteaker et al. 1998).

#### 3.4.1.2 Vegetation

The proposed transmission line (Alternative 1) would extend approximately 5.8 miles from a new switchyard that would be constructed near Earthquake Point to a new substation that would be located in the Entiat Valley, just north of Crum Canyon (Figure 3.1-1). The proposed transmission line would pass through a mosaic of forest, shrub-steppe, and agricultural vegetation types.

Shrub-steppe vegetation type, which consists of one or more layers of perennial grass with a conspicuous but disconnected layer of shrubs, constitutes approximately 69 percent of the area within one-quarter mile of the Proposed Action (Figure 3.4-1). The dominant shrub within this vegetation type is big sagebrush (*Artemisia tridentata*). The forest vegetation types within this area are dominated by ponderosa pine with a lesser component of Douglas fir, and make up approximately 26 percent of the analysis area (514 acres). Forested portions of the project area are comprised of widely spaced conifer trees with limited natural canopy closure.

Figure 3.4-1 and Table 3.4-1 provide a general indication of the distribution of different vegetation types in the analysis area. These data are based on Landsat data (Almack et al. 1993). Landsat analysis is based on reflectance values measured by instruments carried by satellites. These reflectance values are calibrated based on their correlation to vegetation at known sites and the results are extrapolated to produce vegetation maps of large land areas. It should be noted that while useful as a planning tool for analyzing vegetation over large areas, these maps often include site-specific inaccuracies.

**Table 3.4-1. General Vegetation Communities within the Analysis Area**

<b>Vegetation Class</b>	<b>Acres</b>	<b>Percent of Analysis Area</b>
Agriculture	68	4
Bare	4	0
Forest <sup>1/</sup>	514	26
Lush Low Elevation	6	0
Shrub-Steppe	1,363	69
Water	4	0
<b>Total</b>	<b>1,958</b>	<b>100</b>
Note: 1/Includes 35 acres of vegetation associated with the Columbia River, Entiat River, or intermittent stream drainages. Source: Almack et al. 1993		

## Riparian Vegetation and Wetlands

Approximately 35 acres of the forest vegetation type identified in Table 3.4-1 is associated with intermittent stream drainages, the Columbia River, or the Entiat River. The location and acreage of this type of vegetation was identified from a review of Landsat geographic information system data in conjunction with recent aerial photographs. Based on its association with intermittent stream drainages, this vegetation could be broadly defined as riparian vegetation or riparian areas. A riparian area is defined as "...the area adjacent to aquatic systems with flowing water (e.g., rivers, perennial or intermittent streams, seeps, springs) that contains elements of both aquatic and terrestrial ecosystems, which mutually influence each other" (Knutson and Naef 1997).

Review of the National Wetlands Inventory map for the analysis area identified several small wetlands within or adjacent to the analysis area. None of these areas would be crossed or disturbed by the proposed transmission line or temporary access trails.

### 3.4.1.3 Noxious Weeds

A noxious weed species is defined in Washington State as "a plant that when established is highly destructive, competitive, or difficult to control by cultural or chemical practices" (Revised Code of Washington [RCW] 17.10.010). The Washington State Noxious Weed Control Board has three classification levels for noxious weeds (WSNWCB 2007):

- Class A weeds are non-native plants that have a limited distribution within the state. Landowners are required to control Class A weeds.
- Class B weeds are non-native plants that are established in only some regions of the state. Class B weeds are designated for control on a county-by-county and regional basis.
- Class C weeds are non-native plants that are well established within the state, or are of interest to the state's agriculture industry. Local jurisdictions decide on the priority of local control of class C weeds.

The noxious weed survey conducted for this project detected 130 infestations of noxious weeds; 61 of these infestations were identified in locations along the proposed transmission line corridor and temporary access trails, or at the proposed switchyard site (within the project corridor). The remaining 69 infestations were identified along and in the vicinity of the existing, adjacent NFS and BPA access roads (Table 3.4-2). The distribution of noxious weeds and the surveyed areas are mapped in the survey report (Hamer Environmental 2007, Figures 7-1 and 7-2).

**Table 3.4-2. Total (Combined Species) Weed Counts within the Surveyed Areas**

All noxious weeds		Number of Infestations	Number of Individuals	Area of Infestation (feet <sup>2</sup> )	Population Density (1–4) <sup>1/</sup>
Total Survey	<b>Total</b>	<b>130</b>	<b>4,621</b>	<b>243,247</b>	
	Range		1–210	1–40,000	1–4
	Average		36	1,871	1
Within Project Corridor <sup>2/</sup>	<b>Total</b>	<b>61</b>	<b>1,078</b>	<b>165,988</b>	
	Range		1–200	1–40,000	1–3
	Average		18	2,721	1
Outside Project Corridor <sup>3/</sup>	<b>Total</b>	<b>69</b>	<b>3,543</b>	<b>77,259</b>	
	Range		1–210	1–5,200	1–4
	Average		51	1,120	1
Note: 1/Population density: 1 (1–25% cover), 2 (26–50%), 3 (51–75%), 4 (76–100%) 2/“Within project corridor” refers to the transmission line corridor, temporary access trails, and proposed switchyard and substation sites. 3/“Outside project corridor” refers to the existing, adjacent NFS and BPA access roads that were included in the survey. Source: Hamer Environmental 2007					

Four species of Class B noxious weeds were identified during the surveys: diffuse knapweed (*Centaurea diffusa*), Russian knapweed (*Centaurea repens*), houndstounge (*Cynoglossum officinale*), and dalmatian toadflax (*Linaria dalamatica*) (Table 3.4-3). Two additional species, oxeye daisy (*Leucanthemum vulgare*) and bull thistle (*Cirsium vulgare*) were observed in the vicinity of the analysis area, but neither of these species were observed along the proposed transmission line corridor, temporary access trails, or at the proposed switchyard site. These species were also not observed along the adjacent access roads that were included in the survey.

The most commonly detected weed species was diffuse knapweed, which made up 83 percent of all identified weed infestations and 93 percent of all individual species detected. A total of 4,306 individual plants were detected during the survey, 968 of which were within the survey project corridor. The density of diffuse knapweed was greater in the surveyed areas outside the project corridor (Table 3.4-3). Six of the 11 Russian knapweed infestations were within the survey project corridor, all of which were associated with diffuse knapweed infestations. Russian knapweed’s average population density within infestations was 26 to 50 percent cover (Table 3.4-3).

Five houndstounge infestations, consisting of 81 total individual plants were detected during the survey. Three of these infestations were located within the survey project corridor. The average density of houndstounge within these infestations was low, with 1 to 25 percent cover.

A single individual dalmatian toadflax plant was discovered within the survey project corridor. Five additional infestations, consisting of 147 plants, were found along road edges on lands surveyed outside the project corridor (Table 3.4-3).

The field surveys did not identify any sizable sections of the project corridor that are weed-free. Noxious weeds were identified throughout the survey project corridor and especially along the portions of the existing access roads that were surveyed. Weed infestations were greatest near disturbed areas; however, due to the open and sparse conditions within the analysis area, wind dispersal has contributed to the spread of weed species throughout the general area. The density and frequency of weed infestation was greatest in the western portion of the analysis area. A limited number of structures and temporary access trails would be located in relatively weed-free areas, mainly on NFS lands in the east portion of the analysis corridor.

**Table 3.4-3.** Noxious Weed Counts for the Four Weed Species found within the Project Area and along Adjacent Roads.

All Noxious Weeds		Number of Infestations	Number of Individuals	Area of Infestation (sq. ft)	Population Density (1-4) <sup>1/</sup>
<b>Diffuse knapweed (<i>Centaurea diffusa</i>); class B</b>					
Total Survey	<b>Total</b>	<b>108</b>	<b>4,306</b>	<b>219,164</b>	
	Range		1-210	1-40,000	1-4
	Average		40	2,029	1
Within Project Area	<b>Total</b>	<b>51</b>	<b>968</b>	<b>149,083</b>	
	Range		1-200	1-40,000	1-3
	Average		19	2,923	1
Outside Project Area	<b>Total</b>	<b>57</b>	<b>3,338</b>	<b>70,081</b>	
	Range		1-210	1-5,200	1-4
	Average		59	1,229	1
<b>Russian knapweed (<i>Centaurea repens</i>); class B</b>					
Total Survey	<b>Total</b>	<b>11</b>	<b>86</b>	<b>16,770</b>	
	Range		1-36	1-9,600	1-3
	Average		8	1,525	2
Within Project Area	<b>Total</b>	<b>6</b>	<b>74</b>	<b>15,752</b>	
	Range		1-36	1-9,600	1-3
	Average		8	2,625	2
Outside Project Area	<b>Total</b>	<b>5</b>	<b>12</b>	<b>1,018</b>	
	Range		1-5	1-800	1-3
	Average		2	204	2
<b>Houndstounge (<i>Cynoglossum officinale</i>); class B</b>					
Total Survey	<b>Total</b>	<b>5</b>	<b>81</b>	<b>2,852</b>	
	Range		6-28	72-1,400	1-2
	Average		16	570	1
Within Project Area	<b>Total</b>	<b>3</b>	<b>35</b>	<b>1,152</b>	
	Range		6-22	72-600	1
	Average		12	71	1
Outside Project Area	<b>Total</b>	<b>2</b>	<b>46</b>	<b>1,700</b>	
	Range		18-28	300-1,400	1-2
	Average		23	850	2
<b>Dalmatian toadflax (<i>Linaria dalmatica</i>); class B</b>					
Total Survey	<b>Total</b>	<b>6</b>	<b>148</b>	<b>4,461</b>	
	Range		1-67	1-2,000	1-3
	Average		25	744	2
Within Project Area	<b>Total</b>	<b>1</b>	<b>1</b>	<b>1</b>	
	Range		1	1	3
	Average		1	1	3
Outside Project Area	<b>Total</b>	<b>5</b>	<b>147</b>	<b>4,460</b>	
	Range		1-67	1-2,000	1-3
	Average		29	892	2
Note: 1/Population density: 1 (1-25% cover), 2 (26-50%), 3 (51-75%), 4 (76-100%) Source: Hamer Environmental 2007					

#### **3.4.1.4 Rare Plants**

In 1981, the Washington State legislature amended the Natural Area Preserves Act (Ch. 79.70 RCW) and established the Washington Natural Heritage Program (WNHP). The WNHP's responsibilities include maintaining and making available a database of known populations of threatened, endangered, or sensitive plant species and high-quality ecosystems within Washington State. This database, in conjunction with consultations with the USDA Forest Service, Bureau of Land Management (BLM), Washington Department of Fish and Wildlife (WDFW), and Washington Department of Natural Resources (WDNR), was initially used to identify the rare plants that could be potentially present within the analysis area. Two sensitive species were identified as occurring in the general vicinity of the analysis area, the Longsepal globemallow (*Iliamna longisepala*) and the Chelan rockmat (*Petrophoton cinerascens*) (WNHP 2007). These two species were not detected during the vegetation field surveys conducted for the proposed action (Hamer Environmental 2007).

Surveys identified 202 vascular plant species within the surveyed area; however, no sensitive plant species were detected. Individual survey sites contained an average of 52 species with a range of 31 to 77 species per site. Species found during the plant survey are listed in Appendix C to the field report prepared for this project (Hamer Environmental 2007).

### **3.4.2 Environmental Effects**

#### **3.4.2.1 Evaluation Criteria**

The evaluation criteria used to assess the significance of potential effects to vegetation, noxious weeds, and rare plants are as follows. Impacts to vegetation are evaluated based on the acres of vegetation that would be permanently affected and the potential for the Proposed Action to promote, spread, or expand the range of invasive noxious weed species.

Effects to threatened, endangered, or sensitive plant species are possible if populations of any species are found within the potentially affected areas. The degree of effect would depend on the sensitivity of the species and the type of effect imposed. However, as noted in the preceding section, field surveys of the potentially affected areas did not identify any rare plants.

#### **3.4.2.2 Alternative 1 – Proposed Action**

The following sections assess the potential effects of Alternative 1 on vegetation, rare plants, and noxious weeds.

#### **Vegetation**

The potential impacts of Alternative 1 on vegetation are summarized by project component in Table 3.4-4. The Proposed Action would likely affect approximately 8.8 acres of vegetation. The structures that would be installed using trail roads would involve clearing the immediate area of brush and leveling two pads approximately 30 feet by 30 feet in size. This would likely result in the disturbance of approximately 0.3 acre of shrub-steppe vegetation.

**Table 3.4-4.** Estimated Vegetation Disturbance by Project Component and Vegetation Type (acres)

Project Component	Upland Forest	Shrub-steppe	Agriculture	Total
Structures	0.0 <sup>1/</sup>	0.3	0.0	<b>0.3</b>
ROW clearing	1.9	0.0	0.0	<b>1.9</b>
Trails	0.2	1.5	0.0	<b>1.7</b>
Switchyard	0.0	2.0 <sup>2/</sup>	0.0	<b>2.0</b>
Substation	0.0	0.0	1.5	<b>1.5</b>
Laydown Areas <sup>3/</sup>	0.9	0.5	0.0	<b>1.4</b>
<b>Total</b>	<b>3.1</b>	<b>4.4</b>	<b>1.5</b>	<b>8.8</b>

Notes:  
1/Structure-related clearing is estimated to affect approximately 0.03 acre of upland forest.  
2/Although classified as shrub-steppe in Figure 3.4-1 (Almack et al. 1993) much of this area has been previously disturbed.  
3/The three laydown areas are located in areas that have been heavily disturbed in the past. The vegetation in these areas is classified by Almack et al. as either upland forest or shrub-steppe. For the purposes of analysis, it is assumed that half the identified vegetation in these areas would be disturbed as part of this project.

Clearing within the ROW would be limited to vegetation that could potentially affect the transmission line, mainly trees that exceed transmission line clearance requirements, which vary relative to the location of the structures and projected line sag. An estimated 150 trees on federal (NFS and BLM) lands would likely need to be cut under this alternative (Table 3.4-5). In addition, an estimated 19 trees and 6 trees would be cut on WDNR land and WDFW land, respectively. Trees that are 20 inches diameter at breast height (dbh) or larger would be topped and made into snags. Approximately 20 of the identified trees that would need to be cut are 20 inches dbh or larger. These trees are scattered along the ROW. The majority of the cut trees would be downed and left along the ROW, except in areas where they would exceed fuel load density. If adjacent to an existing access road, downed trees could be removed for disposal for fuel wood or logs.

This limited tree felling along the ROW is unlikely to negatively affect canopy closure in the analysis area because forested portions of the project area are comprised of widely spaced conifer trees with limited natural canopy closure. This open spacing between trees is typical of the Ponderosa Pine Forest and Woodlands of the region (Johnson and O'Neil 2001).

**Table 3.4-5.** Estimated Tree Removal on Federal Lands

Tree Height	Tree (dbh)	Total Trees within ROW		Estimated Trees to be Cut		
		NFS	BLM	NFS	BLM	Total
<50	<14 inches	357	10	72	<2	74
50-65	14 – 20 inches	368	20	58	<2	60
>65 feet	> 20 inches	37	5	14	<2	16 <sup>1/</sup>
	<b>Total</b>	<b>762</b>	<b>35</b>	<b>144</b>	<b>&lt;6</b>	<b>150</b>

Notes:  
BLM – Bureau of Land Management  
dbh – Diameter at breast height  
< – less than  
> – greater than  
NFS – National Forest System  
ROW – right-of-way  
1/ Trees that are 20 inches dbh or larger would be topped and made into snags to enhance wildlife habitat.  
Source: USDA Forest Service 2008

The proposed transmission structures would be accessed via existing BPA roads or helicopter. Approximately 17 temporary access trails would be extended from the existing BPA roads. Assuming an average width of 18 feet, these temporary access trails would likely disturb approximately 0.2 acre of

forest and 1.5 acres of shrub-steppe vegetation (Table 3.4-4). Approximately 35 acres of vegetation within the proposed project area is associated with intermittent stream drainages, however, none of these areas would be crossed or disturbed by the proposed transmission line or temporary access trails, with the exception of the edge of an area of vegetation associated with an intermittent stream on WDFW land in the Ribbon Mesa drainage. All temporary access trails would be removed, and their surfaces recontoured and revegetated once construction activities were completed; therefore, these impacts would be temporary and with mitigation in place are not expected to be significant. Vegetation-related mitigation measures are described in Section 2.5.6 of this document.

The proposed switchyard that would be located near State Highway 97 Alternate would permanently impact 2.0 acre of vegetation identified as shrub-steppe vegetation in Figure 3.4-1. This, land located adjacent to the highway, has been disturbed in the past. The proposed substation would be constructed on land currently used as a pear orchard. The orchard would be removed, the site excavated, and insulating rock would be installed. The proposed site is located slightly more than 200 feet from the Entiat River, and all substation-related work would take place more than 200 feet from the river. The existing access road that borders the site to the west and is within 200 feet of the river would be widened to accommodate a mobile substation in case of emergency. The proposed substation site and existing access road are not within the floodplain, and construction and operation of the proposed substation and improvements to the existing access road would not disturb any riparian vegetation. Disturbance associated with the proposed switchyard (2 acres) and substation (1.5 acres) sites would be permanent or at least for the foreseeable future. Both of these areas have been heavily disturbed in the past.

Three temporary laydown areas (each 200 feet by 200 feet) would be needed to store and stage transmission poles prior to construction (see Figures 2-1 and 2-2). These areas have been heavily disturbed in the past and for the purposes of analysis it is assumed that half the vegetation identified in these areas by Almack et al. (1993; Figure 3.4-1) would be disturbed. Any fill material used during the laydown construction would be removed following project completion, and the surface would be recontoured and revegetated. Laydown areas would likely temporarily impact 0.9 acre of upland forest and 0.5 acre of shrub-steppe (Table 3.4-4). Impacts to these previously disturbed areas would be temporary and with mitigation in place are not expected to be significant. Vegetation-related mitigation measures are described in Section 2.5.6 of this document.

### **Noxious Weeds**

The area that would likely be disturbed by Alternative 1 does not have any sizable sections that are weed-free due to preexisting disturbances in the form of roads, trails, agricultural lands, and the existing adjacent transmission corridor. Weed infestations are greatest near disturbed areas; however, due to the open and sparse conditions within the analysis area, wind dispersal has contributed to the spread of weed species throughout the general area. The four species of noxious weeds that were identified during surveys are common throughout Chelan County and the general project area.

It is likely that over time weed infestations would continue to spread throughout the area with or without construction of Alternative 1, but ground disturbance and vehicular traffic are two project-related factors that may be related to and potentially result in an increase in noxious weed distribution. Construction activities under Alternative 1 would likely disturb approximately 8.8 acres of vegetation (Table 3.4-4). Approximately 3.5 acres of this total would be disturbed permanently or at least for the foreseeable future.

Mitigation measures, such as washing equipment prior to entering construction sites from other areas and controlling the quality of seed mixtures used to revegetate disturbed areas would be employed to help reduce the establishment of new noxious weed infestations. Noxious weed-related mitigation measures would take an Integrated Weed Management approach. These measures are described in Section 2.5.6 of

this document. Disturbance associated with the project would be limited and temporary and with mitigation in place is not expected to have a significant effect on the populations of noxious weeds.

### **Rare Plants**

No threatened, endangered, or sensitive plant species were identified within the proposed survey project area. The Longsepal globemallow (*Iliamna longisepala*), a state sensitive species, was identified in an area adjacent to the survey project area, but well outside the area of disturbance. As a result, it is unlikely that Alternative 1 would have direct effects on threatened, endangered, or sensitive plant species.

### **Consistency with the Wenatchee National Forest Plan**

The Forest-wide Standards and Guidelines that apply to the UC-1 (Utility Corridors) designation on NFS lands include standards and guidelines for noxious farm weeds (USDA Forest Service 1990; IV-89, IV-92). Alternative 1 is consistent with the Forest-wide standards and guidelines that are applicable to this project and require that a noxious weed assessment be conducted prior to ground disturbance and priority be assigned by noxious weed class. Further, the noxious weed mitigation measures (see Section 2.5.6 of this document) take an Integrated Weed Management approach and are consistent with the BMPs for noxious weeds established by the Wenatchee National Forest.

#### **3.4.2.3 Alternative 2 – No Action**

Alternative 2 – No Action would not involve new construction or ground disturbance and would, therefore, have no direct or indirect effects on native vegetation, noxious weeds, or rare plants and the existing conditions described in the Affected Environment part of this section, including those associated with BPA's operation and maintenance of the existing BPA transmission lines, would continue unaffected.

#### **3.4.2.4 Cumulative Effects**

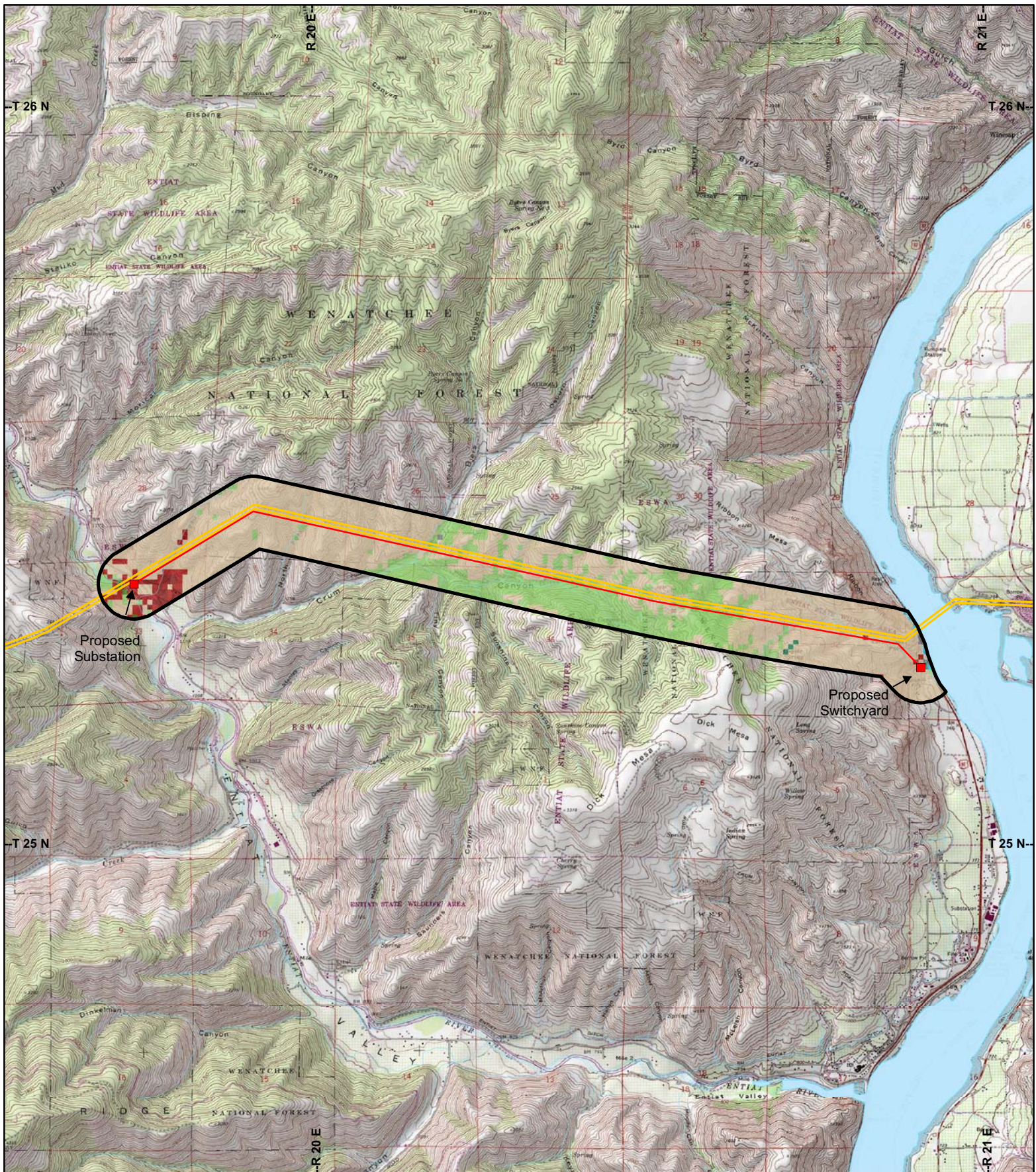
This section considers the incremental effects of the proposed alternatives when added to other past, present, and reasonably foreseeable future actions. Past and present actions affecting resources are included in the affected environment portion of this section. This includes the operation and ongoing maintenance of the existing BPA transmission lines and, as a result, the direct and indirect effects analysis assesses the potential impacts of the Proposed Action in conjunction with these existing lines.

Reasonably foreseeable future actions are defined for the purposes of this analysis as future actions that are planned within or in the immediate vicinity of the project area (defined for this analysis as the area within one mile of the Proposed Action). Projects are considered reasonably foreseeable in time if a plan or permit application has been filed with the county (for private lands) or they are identified as proposed or in progress by the responsible land management agency (for public lands).

The reasonably foreseeable actions included in this analysis are discussed in Section 3.1. These actions include the Crum Canyon Interface Fire Hazard Reduction project, the ongoing Shadow Ridge housing development located south of the proposed switchyard site, and planning permit applications for modifications to or construction of single-family residences within one mile of the Proposed Action.

Fuels reduction projects like the Crum Canyon project affect vegetation by reducing the extent and condition of forested vegetation, changing the age class structure of forests, and providing habitat and distribution for noxious weeds and other non-native species. The Crum Canyon project would be located in close proximity to the Proposed Action, but is expected to be completed at least one year before transmission line construction would begin. The Crum Canyon project is expected to have a positive impact on vegetation and create a more open stand dominated by larger trees with an invigorated grass understory, and the combination of this project with the Proposed Action is not expected to result in substantial negative cumulative impacts on vegetation.

Residential construction projects in the general vicinity of the analysis area would contribute to the overall loss of area native vegetation (assuming the areas to be developed had not been disturbed in the past), increased habitat for noxious weeds, and potential impacts to rare plants and their habitat. However, these projects are not located in close proximity to the limited disturbance that would be associated with the Proposed Action, and viewed in terms of the overall analysis area, the potential combined area of disturbance is low and not expected to result in substantial cumulative effects. Overall, considered together with these past, present, and reasonably foreseeable future actions the cumulative effect of the Proposed Action on vegetation is expected to be low.



## Legend

### Vegetation Types

- Bare and Rock
- Water
- Forest
- Lush Low Elevation
- Shrub Steppe
- Agriculture-Orchards and Crops
- Agriculture-Fallow and Dry Pasture

Proposed Action 1/4 Mile Buffer

Figure 3.4-1 Vegetation Types  
Entiat 115 kV Transmission Line Program



0 0.5 1 Miles

## 3.5 WILDLIFE

### 3.5.1 Affected Environment

This section provides an overview of wildlife habitat types within the analysis area and provides information on key species and their habitat associations. An estimated 336 wildlife species occur within the Entiat Subbasin, including 218 birds, 91 mammals, 16 reptiles, and 11 amphibians (Ashley and Stovall 2004). Key or priority species with the potential to occur in the analysis area include 1) species listed or proposed for listing as Endangered and Threatened under the Federal Endangered Species Act (ESA); 2) U.S. Department of Agriculture (USDA) Forest Service Sensitive species; 3) species classified as Endangered, Threatened, or Sensitive under Washington Administrative Code (WAC) 232-12-297; 4) Wenatchee National Forest management indicator species (MIS); 5) U.S. Department of the Interior Bureau of Land Management (BLM) Special Status species; and 6) species identified under the Washington Department of Natural Resources (WDNR) Forest Practices Habitat Conservation Plan.

Comments made during public scoping for this project identified the following issues with respect to wildlife:

- The proposed action could have detrimental effects to wildlife in the analysis area.
- The proposed action could directly impact mule deer habitat through impacts to vegetation.
- There could be indirect impacts to wintering mule deer from construction, operation, and maintenance activities, as well as from increased human access due to project roads and trails.
- Potential impacts to mule deer could affect gray wolves and grizzly bears, which are Federally listed endangered species within the analysis area and depend on mule deer as a year round food resource and post-emergence spring food resource, respectively.

#### 3.5.1.1 Field Surveys and Analysis Area Description

Field surveys of the proposed transmission line corridor were conducted in 2007 (Hamer Environmental 2007). Biological surveys included Chelan mountainsnail, northern goshawk, northern spotted owl habitat assessment, stick and leaf tree-nests, rare plants, and noxious weeds.

Additional information on wildlife resources in the vicinity of the analysis area, including known and suspected occurrence, was compiled from: 1) existing reports and environmental impact statements (EISs); 2) field survey data; 3) searches of computerized databases; 4) scientific literature; and 5) agency personnel. Computerized database searches for known occurrence information included the Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) database (WDFW 2007a).

The analysis area for the purposes of this discussion generally includes a quarter-mile buffer or corridor around the proposed transmission line route which encompasses all project related activities including all temporary trails used during construction (Figure 3.1-1). A larger analysis area is used to assess cumulative effects to wide-ranging species and includes Bear Management Units, deer winter range units, and fifth-level watersheds.

The analysis area consists of approximately 1,363 acres of shrubs-steppe vegetation (Figure 3.4-1; see Section 3.4, Vegetation). These dry communities consist of one or more layers of perennial grass with a conspicuous but discontinuous overstory layer of shrubs that have been termed “shrub-steppe.” In the Entiat Subbasin, dominant shrubs are bitterbrush (*Pushia tridentata*) and sagebrush in association with bluebunch wheatgrass (*Pseudoroegneria spicata*), junegrass (*Koeleria macrantha*), Sandberg bluegrass (*Poa secunda*), and bottlebrush squirreltail (*Elymus elymoides*). Historically, shrub-steppe vegetation covered 24,000 square miles of Washington (Daubenmire 1988), but over half of this vegetation has been

lost or degraded, primarily due to agriculture and heavy livestock grazing. Repeated or intense disturbance, particularly on drier sites, leads to cheatgrass dominance and replacement of native bunchgrasses (Ashley and Stovall 2004). More than 100 bird species forage and nest in sagebrush communities, and at least four of them (sage grouse, sage thrasher, sage sparrow, and Brewer's sparrow) are obligates, or almost entirely dependent upon sagebrush (Braun et al. 1976 as cited in Ashley and Stovall 2004).

As elevation increases, the shrub-steppe community transitions into open, upland forests dominated by ponderosa pine with a Douglas-fir component (Franklin and Dyrness 1973). There are approximately 514 acres of forest in the analysis area. Stands typically consist of large, widely spaced trees with an understory of grasses, sedges, or forbs; some stands tend towards a multilayered condition with encroaching conifer regeneration (Ashley and Stovall 2004). Common understory associates include bluebunch wheatgrass and Idaho fescue (*Festuca idahoensis*), and shrubs such as bitterbrush common snowberry (*Symphoricarpus albus*). Fire suppression combined with grazing creates conditions that support oak regeneration and invasion by conifers. A substantial amount of this habitat type in Washington State has been lost due to timber harvest, livestock grazing, and urban development. Issues associated with the loss of this habitat type are the loss of key features associated with mature forest condition (e.g., large trees and snags) as well as increased habitat fragmentation.

Approximately 35 acres of the forest vegetation type within the analysis area is associated with the Entiat River and its tributaries, and could be classified as riparian vegetation. As noted in Section 3.4, Vegetation, riparian vegetation in the analysis area was identified for this analysis using Landsat geographic information system data in conjunction with recent aerial photos. Riparian vegetation in the Entiat Subbasin is typically dominated by black cottonwood (*Populus balsamifera trichocarpa*), quaking aspen (*P. tremuloides*), white alder (*Alnus rhombifolia*), peachleaf willow (*Salix amygdaloides*), and a rich assemblage of shrubs (Ashley and Stovall 2004).

In addition to these vegetation communities, approximately 68 acres in the analysis area consists of lands converted primarily from shrub-steppe habitats to agricultural uses including orchards and crops. There are also approximately 6 acres of lush, low elevation shrubland in the analysis area. The remaining 7 acres of the analysis area consist of other habitat types including bare ground, rock, and open water.

### **3.5.1.2 Species Accounts**

A summary of species addressed in this analysis and their regulatory status is presented in Table 3.5-1. The following paragraphs identify potential species of concern that are not addressed further in this analysis.

The analysis area does not occur within the known range of the spotted owl covered by the Northwest Forest Plan, though it is included as a species of special interest by WDNR on their eastside planning units and critical habitat has been documented on the Wenatchee National Forest. A field assessment was conducted in 2007 to determine whether the analysis area contained any suitable spotted owl habitat based on definitions provided by the WDNR Forest Practices Board Manual (WAC 222-16-085) (Hamer Environmental 2007). The results of this assessment indicated that no suitable habitat for spotted owls is present within 1 mile of the transmission line corridor. As a result, the spotted owl is not considered further in this document.

**Table 3.5-1. Regulatory Status of Wildlife Species Addressed in this Analysis**

Species Common Name (Scientific Name)	Federal T&E Listed Species	Federal Candidate Species	Management Indicator Species	Forest Service Sensitive Listed Species	BLM Special Status Species	State T&E Listed Species	Other Special Status Species <sup>1/</sup>
bald eagle ( <i>Haliaeetus leucocephalus</i> )					X	X	X
peregrine falcon ( <i>Falco peregrinus</i> )				X	X		X
northern goshawk ( <i>Accipiter gentilis</i> )							X
golden eagle ( <i>Aquila chrysaetos</i> )							X
barred owl ( <i>Strix varia</i> )			2/				
great gray owl ( <i>Strix nebulosa</i> )				X			X
Lewis' woodpecker ( <i>Melanerpes lewis</i> )			X				X
white-headed woodpecker ( <i>Picoides albolarvatus</i> )			X				X
pileated woodpecker ( <i>Dryocopus pileatus</i> )			X				X
Black-backed woodpecker ( <i>Picoides arcticus</i> )			X				
red-breasted sapsucker							
Williamson's sapsucker ( <i>Sphyrapicus thyroideus</i> )			X				
downy woodpecker ( <i>Picoides pubescens</i> )			X				
hairy woodpecker ( <i>Picoides villosus</i> )			X				
northern flicker ( <i>Colaptes auratus</i> )			X				
three-toed woodpecker ( <i>Picoides dorsalis</i> )			X				
ruffed grouse ( <i>Bonasa umbellus</i> )				X			X
gray flycatcher ( <i>Empidonax wrightii</i> )				X			X
grizzly bear ( <i>Ursus arctos</i> )	X				X	X	X
gray wolf ( <i>Canis lupus</i> )	X				X	X	X
Canada lynx ( <i>Lynx canadensis</i> )	X				X	X	X
mule deer ( <i>Odocoileus hemionus</i> )			X				
bighorn sheep ( <i>Ovis canadensis</i> )							X
western gray squirrel ( <i>Sciurus griseus</i> )				X	X	X	X
Townsend's big-eared bat ( <i>Plecotus townsendii</i> )				X			X
fringed myotis ( <i>Myotis thysanodes</i> )				X	X		
Chelan mountainsnail ( <i>Oreohelix sp.</i> )							X

Note:

1/Includes Federal Species of Concern, State Candidate, State Sensitive, and State Monitor, and Forest Service species.

2/MIS on Okanogan portion of forest only.

Marbled murrelet occurrence in Washington State is limited to the marine environment and inland nesting areas within flying distance of the shore. The project and potential areas of disturbance are well outside of any potential use site, and WDFW PHS data show no occurrences near the action area and no critical habitat is designated in Chelan County (WDFW 2007a; USFWS 1996). Thus, the marbled murrelet is not considered further in this document.

Other species of concern that are not considered further here either due to lack of suitable habitat or indication by agency personnel that they do not occur in the analysis area, include the fisher, mountain goat, beaver, rocky mountain elk, yellow-billed cuckoo, Wenatchee Mountain checker-mallow, ferruginous hawk, pygmy rabbit, sage grouse, sharp-tailed grouse, sandhill crane, marten, wolverine, Columbian white-tailed deer, northern leopard frog, Columbian spotted frog, common loon, eared grebe, sharptail snake, striped whipsnake, and California mountain kingsnake.

Appendix B provides a summary of the Wenatchee National Forest MIS and types of preferred MIS habitat potentially present on NFS lands in the project area. This appendix also displays broad scale habitat trends by rating relative habitat availability and identifying species with declines in habitat capability (as assessed for the Interior Columbia Basin by Lehmkuhl et al. [2001] and Wisdom et al. [2000]). The viability of species with low ratings based on habitat trends (rated 4 in the table in Appendix B) is discussed below in the appropriate species section, linking broad scale trends with project effects.

The following sections describe the wildlife species identified in Table 3.5-1 and their habitat associations. The analysis area referred to in these discussions is, as noted in the preceding section, the area within one-quarter mile of the Proposed Action unless otherwise noted (see Figure 3.1-1).

### **3.5.1.3 Birds**

#### **Bald Eagle**

The bald eagle, a species formerly listed as threatened under the Federal ESA, was delisted in July 2007 (50 Code of Federal Regulations [CFR] Part 17). Protection to the species is still afforded by the Federal Golden and Bald Eagle Protection Act and the Migratory Bird Treaty Act. In addition, Washington State's bald eagle protection rules of 1986 (WAC 232-12-292) established a legal requirement for private, state, and municipal landowners to reach agreement with WDFW on measures to protect breeding and roosting habitat. Bald eagles occur year round throughout Washington. Breeding bald eagles need large trees near open water that is not subject to intense human activity. In Washington, nearly all bald eagle nests (99 percent) are within 1 mile of a lake, river, or marine shoreline (Stinson et al. 2001). Assuming the presence of an adequate food supply, the single most critical habitat factor associated with eagle nest locations and success is the presence of large super-dominant trees (Watson and Pierce 1998). Nest sites in Eastern Washington are most commonly found in ponderosa pine and black cottonwood trees. The closest bald eagle nest is approximately 1.25 miles north of the proposed switchyard in the Ribbon Mesa/McKinstry Canyon area; this nest was active in 2005 (WDFW 2007b). Large trees are also used by bald eagles for perching while foraging.

Roosting habitat for this species typically occurs in uneven-aged forest stands with some old-growth characteristics close to a rich food source (Anthony et al. 1982). Historically, a communal winter bald eagle roost has been used in the Ribbon Cliffs area north of Entiat, Washington (WDFW 2007b). During the winter of 2007, Public Utility District No. 1 of Chelan County (District) staff conducted field surveys for winter communal roosts along the Columbia River and the Entiat Valley in the vicinity of the proposed analysis area (Cordell 2007). One roost was documented in the Ribbon Cliffs area in a stand of large Douglas fir snags where up to 17 eagles were observed roosting. This roost is located approximately 5,000 feet from the proposed switchyard (Pope 2007). A second roost, potentially a spill-over site for the Ribbon Cliffs roost, was documented in the Entiat Valley across the Entiat River Road

and over 2,000 feet from the proposed substation in a Douglas fir stand containing two large snags (Pope 2007; Cordell 2007).

Habitat alteration can limit suitable nesting and roosting habitat, and human disturbance can cause birds to leave their nests (WDW 1991). Within the analysis area, upland forest including pure and mixed ponderosa pine forest provides potential nesting and roosting habitat for bald eagles. Riparian forests along the Entiat and Columbia rivers provide potential foraging and roosting perch trees.

### **Peregrine Falcon**

Peregrine falcons occur year-round in Washington, either as nesting or migratory individuals. Potential nesting and roosting habitat for this species usually includes cliffs or high escarpments that dominate the nearby landscape, although office buildings, bridges, and river cutbanks have been used for nesting as well (USFWS 1982; Craig 1986). Most preferred nesting cliffs are at least 150 feet high, and can occur from sea level to 11,000 feet in elevation (USFWS 1982). Foraging habitat for this species includes open areas such as marshes, lakes, river bottoms, croplands, and meadows with a high abundance of potential prey (e.g., songbirds, waterfowl, and shorebirds). Past declines in the peregrine falcon populations were mainly caused by pesticide pollution (particularly DDT), which led to egg-thinning; however, this threat has been largely eradicated (USFWS 1999). Peregrine falcons in Washington are vulnerable though, due to their limited population size, and are sensitive to disturbances which may jeopardize nest occupancy. The WDFW PHS database does not identify any nesting peregrine falcons in the vicinity of the analysis area and none were identified during the wildlife surveys conducted along the proposed transmission line route in 2007 (Hamer Environmental 2007). However, cliffs in the vicinity of the analysis area provide potential nesting habitat for this species.

### **Golden Eagle**

Golden eagles nest throughout much of Washington State but are most common in the north-central highlands transitional area between montane and shrub-steppe habitats (Watson and Whalen 2003). Golden eagles primarily nest on cliffs or in large trees near open habitats (e.g., shrub-steppe and native grassland communities) that support abundant prey (e.g., small to medium sized mammals) (Marzluff et al. 1997; Kochert et al. 2002). Golden eagles use the same territory annually but may use alternate nests in different years. The migratory status of golden eagles is poorly understood in Washington though in the upper Columbia Basin they are thought to remain through winter (Knight et al. 1979 as cited in Watson and Whalen 2003). Primary threats to this species include habitat loss and disturbance, loss of foraging areas, and direct human-caused mortality (Kochert et al. 2002).

Shrub-steppe habitat within the analysis area provides potential foraging habitat for golden eagles; cliffs within the analysis area provide potential nesting habitat. Three breeding territories are documented in the vicinity of the analysis area, two are located just over 0.5 mile north (Earthquake Point territory) and south (Entiat territory) of the existing and proposed transmission line corridor, respectively, and one (Winesap territory) is over four miles north (WDFW 2007a). There are three known nests in the Entiat territory. No stick nests were found within 100 feet (30 meters) of the proposed transmission line corridor and no golden eagles were documented during 2007 surveys (Hamer Environmental 2007).

### **Northern Goshawk**

Northern goshawks can occur in all forested regions of Washington. Home ranges can be divided into three functional units consisting of a nest area, which contains one or more alternate nest sites, a post-fledging family area (PFA), and foraging area (Reynolds et al. 1992). Goshawks in Washington nest almost exclusively in mature and old-growth forest stands with sufficient overstory cover (60 to 90 percent) and large trees capable of supporting goshawk nests. In Okanogan County, northeast of the analysis area, they have been observed nesting in aspen groves within larger coniferous forest stands (Desimone and Hays 2004). Nest areas also typically contain abundant snags and down wood. PFAs are

areas of concentrated use by females and recently fledged juvenile birds that have not yet dispersed. Structurally complex, mature forest has also been shown to comprise a major component of PFAs where large, widely-spaced trees facilitate sub-canopy flight. Foraging areas for this species comprise the largest portion of their home ranges and typically include a greater diversity of forest age classes and open habitats (e.g., forest edge, shrub-steppe lands) than nest areas or PFAs, and support abundant avian prey populations (Reynolds et al. 1992). Primary threats to this species include the loss and modification of forested habitat which has been implicated in the continued decline in western goshawk populations.

Upland forest within the analysis area provides potential nesting and foraging opportunities for goshawks. The WDFW PHS database (WDFW 2007a) reports four goshawk sightings north of the analysis area including two detections (a pair and a single goshawk) and a possible nest in Switchback Canyon and one detection (a single goshawk) in Byers Canyon; however, none of these records occur within one mile of the proposed transmission line. The Wenatchee National Forest database indicates that a goshawk nest was documented in 1994 on Forest Service land within one mile of the transmission line corridor (USDA Forest Service 2006). In 2007 broadcast acoustic surveys for goshawks were conducted according to agency approved protocol described by Woodbridge and Hargis (2005). No goshawk nests or visual or auditory detections were documented (Hamer Environmental 2007).

### **Barred Owl**

Barred owls can be found year round in most lowland and montane forests throughout Washington; they are associated with large trees in old-growth forests and were selected as an MIS for the Wenatchee National Forest to represent old-growth forest conditions. Barred owls nest in natural tree hollows; in old hawk, squirrel, and crow's nests; and in artificial nest boxes (NatureServe 2007). They are generalist predators, preying on small mammals, birds, frogs, and even large invertebrates. Upland coniferous and deciduous forests in the analysis area provide potential habitat for barred owls. The Wenatchee National Forest database (USDA Forest Service 2006) indicates that barred owls were found at three locations on National Forest System (NFS) land within one mile of the transmission line corridor. No barred owls were documented during field surveys conducted in 2007.

### **Great Gray Owl**

The great gray owl is the largest owl in North America and ranges from central Alaska south to the Sierra Nevada and east through Canada and the northern Rocky Mountains. In Washington, it is found in the Cascade Range and in the northern portion of the state. Nesting and roosting habitat for the great gray owl consists of dense coniferous forest near wet montane meadows (Zeiner et al. 1990). Nests are most frequently located in large, broken-topped snags greater than 24 inches diameter at breast height (dbh) in old-growth fir, mixed conifer, or lodgepole pine forests near the edge of wet meadows and can include nests built by other raptors (Zeiner et al. 1990; Marshall 1996). Breeding great gray owls have been documented northeast of the analysis area in Okanogan County. Upland conifer forest in the analysis area provides potential nesting and foraging habitat for great gray owls and several reliable sightings have been documented on NFS land within 1 mile of the analysis area, one of which was during the breeding season (USDA Forest Service 2006).

### **Other Raptors**

In addition to those described above, raptors that may occur in the vicinity of the analysis area include red-tailed hawks (*Buteo jamaicensis*), American kestrels (*Falco sparverius*), ravens (*Corvus corax*), great horned owls (*Bubo virginianus*), osprey (*Pandion haliaetus*), and western screech-owls (*Otus kennicottii*). Cliffs and large cottonwood and ponderosa pine trees in the analysis area provide potential raptor nest sites. Foraging opportunities for a variety of species are provided by the mosaic of vegetation types comprising the analysis area. In addition to birds actively using the analysis area, others may occur as transients. The Wenatchee National Forest database (Fauna version 1.3.1) indicates that one red-tailed hawk nest was documented on NFS land within 1 mile of the proposed transmission line in 1995. During

surveys conducted in 2007, one red-tailed hawk was observed roosting in a snag within the transmission line corridor (Hamer Environmental 2007). No other raptors were observed in the vicinity of the corridor.

### **Cavity Nesters Including Lewis' and White-headed Woodpeckers**

The northern flicker, black-backed woodpecker, three-toed woodpecker, white-headed woodpecker, Lewis' woodpecker, Williamson's sapsucker, red-breasted sapsucker, downy woodpecker, and hairy woodpecker are key species that could potentially nest in cavity habitat features within the analysis area and as a guild are indicators of mature forests with adequate dead and downed wood. In forests, cavity-nesting birds can account for 30 to 45 percent of the total bird population (Scott et al. 1980). The Lewis' woodpecker and white-headed woodpecker are both state Candidate species and are vulnerable to loss of older, pine-dominated forests, and to the loss of large trees and snags within these forests, and will be briefly considered further here.

The Lewis' woodpecker typically breeds in riparian areas dominated by cottonwoods and oak woodlands, which provide dead trees for nesting and roosting, though open ponderosa pine forests are also used (Saab and Vierling 2001). Characteristics of optimal breeding habitat are related to this woodpecker's foraging methods of hawking and gleaning in brush, and thus include an ample brushy understory that supports insects (Tobalske 1997). Breeding habitat in eastern Washington typically includes an understory consisting of sagebrush, golden current, bitterbrush, and rabbitbrush. Riparian forests within the analysis area provide the most optimal habitat for the Lewis' woodpecker. Field surveys conducted in 2007 documented two Lewis' woodpecker observations along the transmission line corridor, one of which included a pair, but no nest was found (Hamer Environmental 2007).

White-headed woodpeckers are primarily associated with open-canopied, mature, and old-growth ponderosa pine forests. Like the Lewis' woodpecker, they require large, decayed snags for nesting. They are uncommon throughout their range, but can be locally abundant in optimal habitat. Upland coniferous forest in the analysis area provides potential foraging, roosting, and nesting habitat for white-headed woodpeckers. The WDFW PHS database indicates that a white-headed woodpecker was sighted over one mile south of the transmission line corridor in Dissmore Canyon. Field surveys conducted in 2007 documented three observations of white-headed woodpeckers within the analysis area, one of which was suspected to be a nesting pair (Hamer Environmental 2007).

### **Pileated Woodpecker**

The pileated woodpecker inhabit mature and old-growth forests, and second-growth forests with large snags, decaying live trees, and fallen trees which it uses for nesting and roosting (Bull and Jackson 1995, Aubry and Raley 2002). They are primary excavators that create nesting cavities that are used by other forest wildlife species for nesting and foraging (Aubry and Raley 2002). While excavating wood during foraging, they accelerate the wood decay process and expose prey that can be consumed by other species (Aubry and Raley 2002). This species is considered a "keystone habitat modifier" and serves as an indicator of mature forest conditions. Upland coniferous forests in the analysis area provide potential habitat for the pileated woodpecker. No pileated woodpeckers were observed in the analysis area during the 2007 field surveys (Hamer Environmental 2007).

### **Ruffed Grouse**

Ruffed grouse are found in deciduous and mixed deciduous/conifer forests in Washington. They are most abundant in and near riparian habitats where they use heavy brush and thickets of young hardwood trees for cover and feed on the buds and catkins of deciduous trees and shrubs, and on mast, berries, and insects. In eastern Washington, the quaking aspen is the most important tree species for ruffed grouse. The ruffed grouse is an indicator of deciduous and riparian vegetation, and these forest types within the analysis area provide potential habitat for ruffed grouse.

## **Gray Flycatcher**

In Washington the gray flycatcher is associated with open ponderosa pine forests with grassy understories, though it does extend into sagebrush in some parts of Washington. Nests, consisting of a bulky cup of loose materials (e.g., grass, needles, and bark) lined with plant down, feathers, and hair, are typically placed on a large, horizontal branch, against the trunk of a tree. Upland conifer forest within the analysis area provides potential nesting habitat for this species.

### **3.5.1.4 Mammals**

#### **Grizzly Bear**

Grizzly bears are rare in Washington, but there is a small population in the Selkirk Mountains of northeast Washington. Grizzly bears have also been documented in the Okanogan Highlands and in the North Cascades. Contiguous, relatively undisturbed mountainous habitat with a high level of topographic and vegetative diversity is characteristic of most areas where the species exists (USFWS 1993). Floodplains and avalanche chutes are considered important foraging habitat during spring, while berry fields provide herbaceous forage in the spring and berries during late summer and autumn. In some areas, elk and deer winter range and calving areas provide habitat for grizzly bears because these species can be important prey items.

The analysis area occurs in the southern end of the North Cascades grizzly bear recovery zone and includes a portion of the Lower Entiat Bear Management Unit (BMU) #34; however, little suitable habitat exists within the analysis area (Figure 3.5-1). In 2003 a grizzly bear was sighted near Chesaw, Washington, in Okanogan County around 25 miles east of the North Cascades Grizzly Bear Recovery Zone (WDFW 2007a). Threats to the species in this recovery zone include issues related to road access management, small population size, and population fragmentation resulting in genetic isolation (USFWS 1993).

Due to their sensitivity to human disturbance, core grizzly bear habitat consists of all habitat types greater than 1,640 feet (500 meters) from roads (Gaines et al. 2003). Approximately 41 percent of the 167,314-acre Lower Entiat BMU currently contains core grizzly bear habitat (Figure 3.5-1). Although there is a small area considered grizzly bear core habitat within the one-quarter mile analysis area, there would be no project-related disturbance in this area.

#### **Gray Wolf**

Although there are no known viable wolf populations in Washington, increased dispersal of wolves into Washington is expected as a result of the re-establishment of wolf populations in Idaho, Montana, and Wyoming through ongoing wolf recovery programs (WDFW 2007c). The U.S Fish and Wildlife Service (USFWS) has recently proposed to delist the Western Distinct Population Segment (DPS) of the gray wolf once all three states have approved wolf management plans. The WDFW initiated the development of a conservation and management plan for the species in 2006, in anticipation of the return of wolves to Washington. The WDFW PHS database does not document any confirmed sightings within the analysis area, though one confirmed sighting is located approximately 3.75 miles north.

Gray wolves are wide ranging species that are sensitive to human disturbance. Key habitat for the gray wolf is defined as security habitat, which consists of all habitat types containing less than 1.0 mile/square mile of open road, and is expressed in terms of percent of fifth-field watershed area providing security habitat (Gaines et al. 2003). Gaines et al. (2003) defined levels of human influence by the following: low level = greater than 70 percent of watershed contains security habitat, moderate level = 50 to 70 percent of watershed contains security habitat, and high level = less than 50 percent of the watershed contains security habitat. The Lake Entiat and Entiat River fifth-field watersheds encompass the analysis area; however, only the portion of the Entiat River watershed within the analysis area contains a minor amount

(1.1 acres) of security habitat (Figure 3.5-2). Thus the existing level of human influence in both watersheds is high.

### **Canada Lynx**

In the north-central and northeastern parts of Washington, lynx are primarily associated with subalpine and boreal forest types. Lynx typically use areas between 4,600 and 7,100 feet (1,400 to 2,150 meters) in elevation, but in winter use areas lower than 5,020 feet (1,520 meters) (Koehler 1990; Brittell et al. 1989). While they use a variety of forest successional stages, lynx are highly specialized predators of the snowshoe hare and thus the presence of adequate numbers of snowshoe hares is the key characteristic of lynx habitat (Ruggiero et al. 1994; WDFW 2001). Lynx den sites tend to be located in undisturbed mature forest stands (older than 150 years) that have abundant downed woody material and are located near natural travel corridors such as ridges and riparian areas (Brittell et al. 1989; Koehler 1990; WDW 1993a). The analysis area does not contain any optimal lynx habitat.

In November 2006, critical habitat was designated in Montana, Minnesota, and Washington for the contiguous United States distinct population segment of lynx. The portion in Washington is located outside of the analysis area in North Cascades National Park. The Canada Lynx Conservation Assessment and Strategy (Ruediger et al. 2000) provides guidance to Federal agencies with respect to management of lynx habitat on Federal lands which includes the designation of Lynx Management Zones, which are further broken down into Lynx Analysis Units (LAUs). LAUs are roughly equivalent to the size of a lynx home range and serve as a scale at which to assess project level impacts. The project does not coincide with any LAUs, although it does include 4.9 acres of forestland above 3,000 feet in elevation.

### **Mule Deer**

Winter range is the most critical component of mule deer habitat because its quality and quantity determine the survival of deer from one year to the next (Zeigler 1978). In the Entiat Subbasin, the largest concentrations of mule deer occur during winter where there are approximately 56,000 acres of winter range (NPCC 2004). This is a reduction from the approximately 100,000 to 200,000 acres of winter range that historically existed in this subbasin. This reduction has been attributed to: (1) the loss of access to low elevation winter range due to flooding resulting from the construction of the Rocky Reach Dam; (2) the loss of approximately 70 percent of cover and forage provided in the winter range from the 1994 Tyee fire; (3) habitat fragmentation due to road construction; and (4) reduced forage quality and quantity from noxious weeds from historic overgrazing and development (NPCC 2004).

Mule deer use all habitats within the subbasin, but the quality of shrub-steppe habitat determines the size and persistence of the mule deer population (NPCC 2004). The entire analysis area is classified as winter range for mule deer. Potential threats to mule deer include the removal of winter range habitat and disturbance of wintering deer due to construction activity, as well as reduced forage quality due to noxious weeds and increased disturbance due to access along roads following construction. In addition, adverse impacts to the mule deer population could have effects on wolves and grizzly bears because deer are important year-round food resource and a post-emergence spring food resource for these species, respectively.

Based on a literature review of the effects of linear recreation routes on wildlife, Gaines et al. (2003) describe a zone of influence along roads where mule deer may be displaced by human activity, experience increased hunting pressure, or be susceptible to vehicle collisions. The extent of this zone varies, depending on the type of road and level of use. For plowed roads, the zone of influence is 800 meters on each side; for trails and other unplowed routes the zone of influence is 150 meters on each side. To determine the existing and potential level of human influence on winter range an index of habitat effectiveness can be derived by determining the proportion of the entire winter range unit or a suitably

large area (e.g., 800 to 1200 hectares; Lyon 1983 as cited in Gaines et al. 2003) that is influenced by winter recreation. If greater than 70 percent of the winter range is outside the zone of influence it is rated as having a low level of human influence; 50 to 70 percent outside the zone of influence indicates a medium level of human influence; and less than 50 percent outside the zone of influence indicates a high level of human influence (Gaines et al. 2003).

There are three winter range units that coincide with the analysis area: the Columbia-Entiat unit, which includes the largest, central part of the analysis area; the Chelan County unit which is a u-shaped unit that covers the proposed switchyard and substation sites, but otherwise extends south of the analysis area; and the Swakane Canyon unit which is southeast of the analysis area and includes only a small portion of the analysis area east of the proposed substation site. Table 3.5-2 summarizes the habitat effectiveness of each winter range unit based on the existing level of human influence. Winter range units are shown in Figure 3.5-3.

**Table 3.5-2.** Existing Habitat Effectiveness based on Level of Human Influence in the Mule Deer Winter Range Units that Coincide with the Analysis Area

Winter Range Unit	Total Acres	Acres Outside the “Zone of Influence” (%) <sup>1/</sup>	Existing Level of Human Influence <sup>2/</sup>
Columbia-Entiat	56,260	39,499 (70.2)	Low
Chelan County	25,447	12,873 (50.6)	Medium
Swakane Canyon	74,511	66,034 (88.6)	Low
Notes: 1/Zone of influence where activity along roads adversely affects mule deer; defined by Gaines et al. (2003) as 150 meters from trails and 800 meters from plowed roads. 2/Based on proportion of winter range unit outside the “zone of influence”: low $\geq 70\%$ , medium = 50-70%, high $\leq 50\%$ (Gaines et al. 2003).			

## Bighorn Sheep

Bighorn sheep historically occurred throughout the Entiat Basin, though heavy grazing pressure by domestic animals, which compete for similar forage, greatly reduced populations by 1900. Bighorn sheep were reintroduced to the Swakane Canyon, south of the analysis area, and may use a portion of the basin and thus potentially occur in the analysis area (CCCD 1999). Bighorn sheep typically use grasslands or grass/shrub habitats adjacent to, or intermixed with precipitous terrain characterized by rocky slopes, ridges and cliffs, or rugged canyons (Johnson 1983). Rock features provide escape terrain and are also used for lambing. Threats to bighorn sheep in this region include loss of native vegetation used as forage, disturbance during winter through mid-June, and disease transmitted from domestic sheep.

## Western Gray Squirrel

Western gray squirrels are found in Washington, Oregon, California, and in a small part of Nevada. The North Cascades population includes isolated pockets in Chelan and Okanogan counties, which are limited to several drainages in the Methow watershed (WDW 1993b); western gray squirrels have also been observed on the south end of Chelan Butte and along the south shoreline of Lake Chelan and have historically occurred in the Entiat Valley (Patterson 2007). Western gray squirrels are both arboreal and terrestrial and are found in oak-conifer and late-successional forest with trees of sufficient size to produce an interconnected canopy for arboreal travel (Foster 1992). Western gray squirrels build large, limb-supported tree nests in oaks, Douglas fir, or pines. Nests, which are built in tree cavities or on limbs, usually occur in stands of trees within 600 feet of water (Foster 1992). Riparian forests within the analysis area provide potential habitat for western gray squirrels. No leaf nests were found within 100 feet (30 m) of the proposed transmission line route (Hamer Environmental 2007). In addition, although the western gray squirrel is diurnally active, no individuals were seen during the stick and leaf

nest survey or any of the other botanical or wildlife surveys that were conducted in the analysis area (Hamer Environmental 2007).

### **Townsend's Big-eared Bat**

The presence of suitable undisturbed roost, nursery, and hibernaculum (i.e., wintering hibernation) sites is the most important habitat component dictating the presence of this species (Perkins and Levesque 1987). Maternity and hibernation colonies typically occur in caves and mine tunnels, but may also occur in buildings and on the undersides of bridges (WDW 1991). These sites are also used for night roosts. Barns and abandoned buildings also provide potential maternity sites and night roosts.

Primary threats to this species include changes in microclimate conditions due to human activities (e.g., removal of vegetation) that render roost, nursery, and hibernacula unsuitable to bats, and the direct disturbance of bats using these areas (Zeiner et al. 1990; WDW 1991). Key habitats for Townsend's big-eared bats in the analysis area include cliffs and talus because these features have the greatest potential to provide suitable roost, nursery, and possibly, hibernacula. Orchard-related outbuildings near the Entiat River could also potentially serve this purpose.

### **Fringed Myotis**

Fringed myotis occurs in habitats similar to those described above for the Townsend's big-eared bat, primarily at middle elevations of 1,200-2,150 meters in desert, grassland, and woodland habitats. They roost in caves, mines, rock crevices, buildings, and other protected sites. Nursery colonies occur in caves, mines, and sometimes buildings. Like the Townsend's big-eared bat, the presence of these habitat components dictates the presence of this species. Fringed myotis are insectivorous and they often forage close to vegetative canopy. Typically this species is active between April and September, and hibernates with periodic interruptions during the rest of the year (O'Farrell and Studier 1980).

#### **3.5.1.5 Terrestrial Mollusks**

##### **Chelan Mountainsnail**

The Chelan mountainsnail is endemic to northeastern Chelan County. It has been recorded in the Chelan, Entiat, and Leavenworth ranger districts on the Wenatchee National Forest (Duncan 2005). The Chelan mountainsnail is associated with schist talus and found in litter or under shrubs on the edges of open dry ponderosa pine and Douglas fir forest stands with pinegrass or elk sedge understory (Duncan 2005).

Primary threats to this species include activities that compact or otherwise disturb the soil, alter temperature or moisture regimes of the habitat (e.g., reduce shading, create or improve site drainage), or create barriers to dispersal such as the removal of talus, road construction and maintenance, logging, grazing, and wildfire (BLM 1999). These activities are particularly detrimental in the spring and fall when this species is active on the surface or in leaf litter.

Surveys for Chelan mountainsnails were conducted on BLM and USDA Forest Service lands within the analysis area, as well as public lands potentially crossed by temporary access trails, in the spring of 2007. A total of 111 individual Chelan mountainsnails and shells were documented along a small portion of the proposed transmission line corridor comprising a total distance of 0.384 mile, and were concentrated between proposed structure locations 6 and 9 (Hamer Environmental 2007). Snails located between proposed structure locations 6 and 8 occurred in shrub-steppe habitat dominated by bitterbrush, bluebunch wheatgrass, and arrowleaf balsam root with sparse ponderosa pine (approximately 10 percent canopy cover); between structures 8 and 9 they were located in open ponderosa pine and Douglas fir stands with 40 to 70 percent canopy cover (Hamer Environmental 2007).

### 3.5.2 Environmental Effects

This section assesses the potential effects of the Entiat 115 kV Transmission Program on individual species of concern, based on the criteria significance levels established below. The direct and indirect effects of Alternatives 1 and 2 are evaluated in Sections 3.5.2.2 and 3.5.2.3, respectively. The cumulative effects of the proposed alternatives are evaluated in Section 3.5.2.4. Direct, indirect, and cumulative effects are defined in Section 3.1 of this document.

#### 3.5.2.1 Evaluation Criteria

The primary indicators used as evaluation criteria are as follows:

- Acres/percent of wildlife habitats including shrub-steppe, forest, riparian/wetland, agriculture, and developed
- Acres/percent of potential habitat for key species lost within the analysis area
- Loss of other potential habitat structures such as snags, down logs, cliff/talus slopes
- Loss of core and security habitat for grizzly bear, and wolf, respectively
- Zone of Influence from existing and proposed roading on mule deer winter range

Significance levels used to determine impact to wildlife species and/or their habitats are as follows:

- There would be a *high* level of effect if:
  - Project activities cause long-term declines in the quality and quantity of key wildlife habitats within or near Alternative 1;
  - Quantity or quality of habitat critical for local animal populations, such as mule deer winter range, are substantially reduced or fall below Wenatchee National Forest Land and Resource Management Plan (Forest Plan) standards and guidelines;
  - Rare or declining ESA-listed species are adversely affected, such as grizzly bear, gray wolf, or Canada lynx; or
  - Adverse impacts to threatened and endangered wildlife cannot be mitigated.
- There would be a *moderate* level of effect if:
  - Activities create an effect on key wildlife species but could be partially mitigated through an interagency consultation with the USFWS under Section 7 of the ESA;
  - Activities moderately reduce the productivity of adjacent wildlife habitats or resources such as nest sites;
  - Project activities cause short-term reduction of local populations of prey species; or
  - Impacts on wildlife species can be partially mitigated.
- There would be a *low* level of effect if:
  - Project activities cause an effect on key wildlife species that could be largely mitigated;
  - There are short-term declines in the quality or quantity of existing wildlife habitat within or near the proposed action alternative;
  - A common wildlife species suffers temporary disturbance, not resulting in mortality or injury;
  - Habitat reduction occurs to habitat that is very common within the analysis area; or
  - Impacts on wildlife species can be fully or mostly mitigated, and/or minimized by site planning or by placing seasonal restrictions on activities.
- There could be *no effect* when there is no degradation of existing habitat, disturbance, injury, or death to a wildlife species.

### 3.5.2.2 Alternative 1 – Proposed Action

Under Alternative 1 – Proposed Action, potential impacts to wildlife habitat could result from the installation of the proposed transmission line structures and associated temporary access trails, from limited right-of-way (ROW) clearing, from switchyard and substation construction, or from the proposed temporary laydown areas. Permanent loss of wildlife habitat would occur where vegetation removal is associated with structure placements and the proposed switchyard and substation sites. Clearing within the proposed transmission line right-of-way that would involve tree removal, would allow shrubs and grass to become established. Vegetation clearing also increases habitat fragmentation that may create travel barriers for less mobile species. Potential habitat removal is summarized by vegetation type in Table 3.5-3.

**Table 3.5-3. Estimated Wildlife Habitat Disturbance by Vegetation Type and Project Component**

Project Component	Upland Forest	Shrub-steppe	Agriculture	Total
Structures	0.0 <sup>1/</sup>	0.3	0.0	<b>0.3</b>
ROW clearing	1.9	0.0	0.0	<b>1.9</b>
Trails	0.2	1.5	0.0	<b>1.7</b>
Switchyard	0.0	2.0 <sup>2/</sup>	0.0	<b>2.0</b>
Substation	0.0	0.0	1.5	<b>1.5</b>
Laydown Areas <sup>3/</sup>	0.9	0.5	0.0	<b>1.4</b>
<b>Total</b>	<b>3.1</b>	<b>4.4</b>	<b>1.5</b>	<b>8.8</b>
Notes: 1/Structure-related clearing is estimated to affect approximately 0.03 acre of upland forest 2/Although classified as shrub-steppe in Figure 3.4-1 (Almack et al. 1993) much of this area has been previously disturbed. 3/The three laydown areas are located in areas that have been heavily disturbed in the past. The vegetation in these areas is classified by Almack et al. as either upland forest or shrub-steppe. For the purposes of analysis, it is assumed that half the identified vegetation in these areas would be disturbed as part of this project.				

Construction-related activities (structure installation, switchyard and substation construction, use of heavy equipment, helicopters, potential blasting, and high levels of human activity around the construction sites; road work; and limited ROW clearing) and potential operation-related activities (road use and increased activity around structures) would result in temporary impacts associated with noise and human presence that have the potential to affect individual wildlife species using the analysis area. Ongoing operation and maintenance activities associated with the adjacent existing Bonneville Power Administration (BPA) transmission lines would continue and contribute to potential cumulative effects to wildlife. The following sections discuss these potential impacts for each species of concern (see Table 3.5-1).

#### **Birds**

##### ***Bald Eagle***

Primary concerns related to bald eagles associated with Alternative 1 include removal of suitable foraging habitat and roost perch trees, disturbance of nests or roost sites and breeding/wintering bald eagles, and electrocution and collision with power lines. No bald eagles nests occur within the analysis area, though winter bald eagle roosts were documented approximately 5,000 feet north of the potential switchyard site and 2,000 feet south of the proposed substation site during field surveys in January 2007 (Cordell 2007). Wintering bald eagles are also commonly seen along the Ribbon Cliffs area. Winter foraging by bald eagles in the vicinity of the analysis area occurs primarily along the major rivers (e.g., the Columbia and Entiat rivers). No removal of riparian habitat, and therefore loss of suitable foraging and roosting perch trees, would occur along these rivers under this alternative. In addition, construction activities would not occur during the time that the majority of bald eagles use the area (i.e., early-November through mid-March), and therefore disturbance to wintering bald eagles would be low.

Construction would occur during the nesting season (approximately mid March through mid July in eastern Washington); however, the proposed mitigation measures would provide protection to any large stick nest found during construction and also specify that disturbance to breeding eagles, and other raptors should be avoided. Proposed mitigation measures include timing construction activities, including helicopter use, such that they would take place after nesting has occurred and after the young have fledged (see Section 2.5.7).

The potential for increased risk of collision with the proposed transmission line is also low given the height configuration of the proposed transmission line, which would be lower than the adjacent existing BPA transmission lines. In addition, the closest wintering bald eagles identified during the 2007 survey were observed approximately 2,000 feet from the proposed substation site (Cordell 2007).

To further eliminate electrocution potential and effectively reduce collision potential, this project would be built according to the suggested practices identified by the Avian Power Line Interaction Committee (APLIC 2006), as well as the guidelines outlined in the USFWS-approved *Avian Protection Plan Guidelines, April 2005* to reduce potential avian electrocution and collision concerns. Therefore, Alternative 1 would have a low level of effect bald eagles.

### ***Peregrine Falcon and Golden Eagle***

No cliff habitat would be directly affected under the Proposed Action. Therefore, there would be no effect associated with habitat loss for these species. No peregrine falcon nests were documented during 2007 surveys, however should they be discovered during construction, no activities would occur within 0.25 mile of that nest until the District confers with WDFW to determine an appropriate course of action. Golden eagle breeding territories in the vicinity of the analysis area are all more than 0.5 mile away and would not be affected by noise or human activity during construction or operation of the project. To ensure this, helicopter flight paths would be designed to avoid these areas. Because both species may forage within the existing BPA ROW, and thus the proposed ROW, there is potential for electrocution and collision with transmission lines. However, this risk would be minimized by following APLIC guidelines and other agency approved guidelines, as described above under the bald eagle. Therefore, Alternative 1 would have a low level of effect on peregrine falcons and golden eagles.

### ***Northern Goshawk, Barred Owl, Great Gray Owl, and Other Raptors***

Total estimated disturbance of approximately 3.1 acres of upland forest would reduce the amount of potentially available foraging and nesting habitat for goshawks, barred owls, great gray owl, and other raptors occurring in the analysis area. Tree removal, especially removal of mature trees, would, however, be limited and isolated to areas adjacent to the existing BPA ROW. In addition, any trees that would need to be downed would be left on the ground as large woody debris, or high-topped and left as snags, which would provide a substrate for small mammal prey species (see additional detail under cavity nesters below). An estimated 150 trees have been identified as potential hazard trees (i.e., have the potential to fall onto the line, grow into the line within 25 years, or encroach on minimum conductor clearance standards) on federal lands (NFS and BLM) and would need to be cut (Section 2.4.1). In addition, an estimated 19 trees and 6 trees would be cut on WDNR land and WDFW land, respectively. Trees that are 20 inches dbh or larger would be topped and made into snags. These trees are scattered along the ROW.

Although construction may occur during the nesting seasons for these species, mitigation measures provide protection to any large stick nest and include timing construction such that activities, including helicopter use, would take place after nesting has occurred and after the young have fledged. These species may also be at risk of electrocution and collision with transmission lines; however, as described above, following APLIC guidelines and other agency approved guidelines for transmission line construction would minimize this risk. Based on the small expected reduction in upland forest types and

with the proposed mitigation measures in place, Alternative 1 would have a low level of effect on northern goshawks, barred owls, great gray owls, and other raptors occurring in the analysis area.

### ***Cavity Nesters Including Lewis' and White-headed Woodpeckers***

Cavity nesters including woodpeckers, sapsuckers, and flickers that specialize in nesting and foraging in decayed wood are limited by the availability of snags and downed wood. Reductions in snag density could potentially occur from the selective removal of hazardous snags along the proposed transmission line ROW. Reduced snag density would decrease the potentially available habitat for this guild. However, all hard snags, damaged and dying trees, and defective live trees would be maintained along the transmission line ROW, except those considered safety hazards at the time of construction. Snags of particular importance are those that are large (more than 15 inches dbh), tall (more than 60 feet), and possess greater bark cover (USDA Forest Service 1985). An estimated 150 trees have been identified as potential hazard trees (i.e., have the potential to fall onto the line, grow into the line within 25 years, or encroach on minimum conductor clearance standards) on federal lands (NFS and BLM) and would need to be cut (Section 2.4.1). In addition, an estimated 19 trees and 6 trees would be cut on WDNR land and WDFW land, respectively. Trees that are 20 inches dbh or larger would be topped and made into snags. These trees are scattered along the ROW. Some coarse woody debris may also be used to block access to rehabilitated trails. The District would consult with the appropriate agency and/or landowner regarding any tree felling and snag/coarse woody debris requirements within or near the proposed ROW prior to cutting trees. Therefore, Alternative 1 would have a low level of effect on cavity nesters.

The majority of the cut trees on NFS lands would be downed and left along the ROW, except in areas where they would exceed fuel load density as specified in the Forest-wide Assessment for Late Successional Reserves and Managed Late Successional Areas for the Wenatchee National Forest (USDA Forest Service 1997b). Alternative 1 would be consistent with the Northwest Forest Plan (NWFP) and Wenatchee National Forest coarse woody debris standards and guidelines that apply to the NFS lands that would be affected under this alternative. As shown in Table 3.5-3, approximately 3.1 acres of forested habitat would be affected and the strategy to leave cut logs scattered along the ROW and top individual trees would meet or exceed NWFP snag and coarse woody debris requirements (USDA Forest Service 1997b).

Habitat viability for the Lewis's and white-headed woodpeckers is assessed for the Interior Columbia Basin by Lehmkuhl et al. (2001) and Wisdom et al. (2000) as "habitat exists as isolated patches with limited opportunity for population interactions" and "local populations may be extirpated" (category 4 in the table in Appendix B). Conservation measures for coarse woody debris in the NWFP will ensure continued habitat availability for the Lewis's and white-headed woodpeckers. The proposed transmission line is consistent with the NWFP coarse woody debris guidelines and will, therefore, maintain or restore habitat viability for these species.

### ***Pileated Woodpecker***

The estimated disturbance of approximately 3.1 acres of upland forest proposed under Alternative 1 would result in a minor amount of habitat loss for pileated woodpeckers, which serve as indicators of mature and old-growth forest. Removal of mature trees is expected to be limited and therefore the level of effects to pileated woodpeckers under Alternative 1 would be low.

Habitat viability for the pileated woodpeckers is assessed for the Interior Columbia Basin by Lehmkuhl et al. (2001) and Wisdom et al. (2000) as "habitat exists as isolated patches with limited opportunity for population interactions" and "local populations may be extirpated" (category 4 in the table in Appendix B). Conservation measures for coarse woody debris in the NWFP will ensure continued habitat availability for the pileated woodpeckers. The proposed transmission line is consistent with the NWFP coarse woody debris guidelines and will, therefore, maintain or restore habitat viability for this species.

### ***Ruffed Grouse***

Clearing of riparian vegetation along transmission line ROWs and associated temporary access trails could decrease the amount of potential foraging, nesting, and breeding habitat for ruffed grouse. Impacts to riparian vegetation would be limited to disturbance to a small area of vegetation associated with an intermittent stream drainage on WDFW lands. All other riparian vegetation within the analysis would remain unaffected for use by ruffed grouse. Construction activities near riparian habitats may result in temporary disturbance to ruffed grouse should they be present, but overall, Alternative 1 is expected to have a low level of effect on ruffed grouse.

### ***Gray Flycatcher***

The estimated disturbance of approximately 3.1 acres of upland conifer forest under Alternative 1 would result in habitat loss for the gray flycatcher. However, this loss would be minor and would not preclude gray flycatchers from nesting in the analysis area. Therefore, Alternative 1 would have a low level of effect on gray flycatchers.

## **Mammals**

### ***Grizzly Bear***

Although the North Cascades grizzly bear recovery zone encompasses the analysis area and a portion of the Lower Entiat BMU falls within the analysis area, there is little suitable habitat present for grizzly bears. In addition, none of the core grizzly bear habitat, defined as areas greater than 1,640 feet from roads (Gaines et al. 2003), would be removed under Alternative 1. The 1993 Grizzly Bear Recovery Plan (USFWS 1993) identified important potential linkage zones between existing adjacent grizzly bear recovery zones and populations that warranted further analysis. The area encompassing the project was not identified as an important linkage zone due its distance from other recovery zones and populations, and the presence of extensive areas of open habitat (e.g., shrub-steppe and agriculture) coupled with highways and other human development. However, because grizzly bears are wide-ranging, and have been documented north of the analysis area, it is possible, though not probable, that a grizzly bear could wander into the analysis area. The construction of a new line would not change current areas of grizzly bear core habitat. In addition, the construction disturbance would be temporary and would not preclude bears from using the area. Therefore, Alternative 1 would have a low level of effect on grizzly bears.

Deer are an important prey species for bears and, as a result, bears may be affected by adverse effects to deer or deer winter range habitat. Mitigation measures would be implemented to minimize effects to mule deer (see the discussion under mule deer subsection below and Section 2.5.7). Therefore, Alternative 1 would have a low level of indirect effect on grizzly bears.

### ***Gray Wolf***

Although no viable wolf population is known to exist in the vicinity of the analysis area, the analysis area could serve as part of a larger home range or as a travel linkage to these wide-ranging carnivores. However, no direct impacts to gray wolves are anticipated under Alternative 1 because it would not remove any security habitat (defined as areas with a road density of less than 1 mile/square mile) from the Entiat River fifth-field watershed and the level of human influence in the watershed would remain unchanged. Although construction activities could disturb wolves transiting through the area, these effects would be temporary and would occur in an area that has already been substantially altered by timber harvest, road building, residences, and grazing.

Deer are an important prey species for wolves and, as a result, wolves may be affected by adverse effects to deer or deer winter range habitat. Mitigation measures would be implemented to minimize effects to

mule deer (see the discussion under mule deer subsection below). Therefore, Alternative 1 would have a low level of direct and indirect effects on gray wolves.

### ***Canada Lynx***

No habitat removal would occur above 3,000 feet in elevation, the only potential lynx habitat in the analysis area. Therefore, Alternative 1 would have no effect on lynx.

### ***Mule Deer***

Potential effects of the proposed action alternative on mule deer include removal of winter range habitat, disturbance to wintering mule deer due to construction and operation of the transmission line and associated facilities, increased human access due to project roads and trails, and reduced forage quality.

A total of approximately 8.8 acres of winter range habitat would likely be affected by the project. This includes 5.3 acres in the Columbia-Entiat unit and 3.5 acres in the Chelan County unit resulting in an overall reduction of less than 1 percent of each unit. Habitat removed would consist of forest and shrub-steppe due to clearing of the ROW. This minor amount of habitat disturbance/removal would not preclude the continued use of the analysis area as winter range.

Human activity along roads and trails can reduce the effectiveness of a winter range for deer, resulting in displacement from or avoidance of otherwise suitable habitat, increased hunting or poaching pressure, and increased risk of collisions with vehicles. Although the primary access to the proposed transmission structures associated with this alternative would be via existing roads, there would be an overall increase in human activity during construction along those roads and the construction of approximately 0.8 mile of temporary access trails would increase the extent of this activity in the Columbia-Entiat winter range unit. No temporary access trails would be constructed in either of the other winter range units that coincide with the analysis area.

Even taking these temporary access trails into account, Alternative 1 would maintain the existing, low level of human influence on winter range units because none of these temporary trails are proposed within the zone of influence. The proposed temporary access trails would only provide temporary access to the analysis area and would be closed following construction. It is, therefore, unlikely that these temporary access trails would provide increased access for off-highway vehicles or snowmobiles or lead to the harassment or poaching of already stressed, wintering deer. Moreover, construction activities would occur outside of the time that deer would be migrating into and using the winter range (see Section 2.5.7). Although construction may occur during the fawning season (late April to mid-June) and may displace deer in the immediate vicinity of the work areas, all activities, including helicopter use, would be localized and temporary in nature.

Ground disturbance associated with transmission line structures and temporary access trails could result in the establishment of noxious weeds, reducing forage quality by competing with higher-quality, native vegetation. This potential impact would, however, be mitigated by the Integrated Weed Management approach that would be used to manage weeds in disturbed areas (see Section 2.5.6). Given the timing and extent of construction activity and taking into account the proposed mitigation measures, Alternative 1 would have a low level effect on mule deer and mule deer winter range, and therefore no effects are anticipated for wolves or grizzly bears as a result of effects on deer.

Habitat capability for mule deer is described as in decline by the Interior Columbia Basin by Lehmkuhl et al.(2001) and Wisdom et al. (2000). Winter Range Standards and Guidelines in the Wenatchee Forest Plan ensure the continued availability and capability for mule deer winter range on NFS lands. The proposed transmission line is consistent with the Winter Range Standards and Guidelines and will, therefore, maintain or restore habitat capability for mule deer on NFS lands.

### ***Bighorn Sheep***

Due to the proximity of the analysis area to Swakane Canyon, bighorn sheep have the potential to use the analysis area. Cliffs provide potential lambing habitat and escape terrain for avoiding predators. Because a majority of the activity in the analysis area would be limited to the construction period, and would occur occasionally during operation thereafter, bighorn sheep would not be precluded from using the analysis area. Additionally, no cliff habitat known to be suitable for bighorn sheep would be removed or altered by the transmission line or associated structures. Therefore, Alternative 1 would have a low level of effect on bighorn sheep.

### ***Western Gray Squirrel***

Removal of riparian habitat would decrease the amount of habitat potentially available to western gray squirrels. Under Alternative 1, riparian areas would be spanned to the extent practicable to reduce the amount of potential disturbance. Impacts to riparian vegetation would be limited to disturbance to a small area of vegetation associated with an intermittent stream drainage on WDFW lands. This minor disturbance would not be expected to increase habitat fragmentation or result in a decrease the interconnectedness of the forest canopy required by western gray squirrels for arboreal travel. Therefore, Alternative 1 would have a low level of effect on western gray squirrels.

### ***Townsend's Big-eared and Fringed Myotis Bats***

Townsend's big-eared and fringed myotis bats are especially susceptible to disturbance of roost, nursery, and hibernaculum sites. None of the suitable cliffs and or talus slope habitats in the analysis area, which provide potential habitat for these species, would be directly affected under Alternative 1. Further, any construction- or operation-related disturbance in the vicinity of these areas would be localized and temporary. Therefore, Alternative 1 would have no effect on Townsend's big-eared or fringed myotis bats.

### **Terrestrial Mollusks**

#### ***Chelan Mountainsnail***

Chelan mountainsnail populations were identified in the immediate vicinity of two of the proposed transmission line structure locations (structures 7 and 8) during field surveys conducted in 2007 (Hamer Environmental 2007). At structure sites where Chelan mountainsnails are present, equipment would be delivered via helicopter and holes for the structures would be hand dug. To avoid burying snail sites, soil excavated from holes would not be spread at the site. Excess excavation would be disposed of at an agreed location on the nearby BPA access road. This would eliminate the need for temporary access trails in these areas and reduce the footprint of the structure location minimizing impacts to this mollusk species and its habitat. Impacts to other potential Chelan mountainsnail populations would be reduced by minimizing disturbance to talus in which these snails potentially occur and removal of downslope materials that may destabilize talus or alter environments within talus. By implementing these mitigation measures, Alternative 1 would have a low level of effect on Chelan mountainsnails.

### **Consistency with the Wenatchee National Forest Plan**

NFS lands within the analysis area are classified as Deer and Elk Winter Range (EW-1) or Utility Corridor (UC-1) land use designations. The general management goal of EW-1 is to "manage deer and elk winter range to meet the habitat requirements for sustaining optimum carrying capacity." The following four Forest Plan standards and guidelines that apply to EW-1 lands pertain to this project (IV-114):

- Within deer and elk winter range, limit activities (defined as anything that may cause an animal stress) to corridors to access for other areas from December 1 to April 15;

- Manage winter range north of the Wenatchee River for deer;
- Manage winter range in cooperation with the WDFW to reduce damage to neighboring private lands;
- Manage primary cavity excavators at 60 percent of the potential population level; and
- Manage wildlife habitats in managed forests to maintain an optimum ratio of 40 percent cover and 60 percent forage.

Alternative 1 would be consistent with these standards and guidelines. No project activities are planned during seasonal restrictions from December 1 to April 15 in areas classified as EW-1 and disturbance to winter range habitat would be minimized through the use of existing access roads and/or helicopters to deliver and set transmission line structures. Wildlife-related mitigation measures that would be implemented under this alternative are identified in Section 2.5.7. Although managing primary cavity excavators at 60 percent of the potential population level is outside of the scope of this project, snag creation and retention requirements create and maintain suitable habitat for cavity nesters within the analysis area, thereby maintaining a low level of effect to these species. Finally, of the 215 acres of forest within the analysis area less than 1 percent would be removed by the project, thus the project would not affect existing forest/cover ratios.

There is also one standard and guideline that applies to UC-1 lands pertaining to this project (IV-224) that requires compliance with Forest-wide standards and guidelines (IV-83-84) for structural and nonstructural habitat improvements. Wildlife related standards and guidelines applicable to this project include:

- Strive to provide an abundance of herbaceous vegetation with a high nutrient content in spring and fall range of big game.

Measures for revegetating disturbed areas include the use of native seed mixes that would facilitate the growth of forage plants with a high nutrient content (see Section 2.5.7).

Alternative 1 would also be consistent with the snag and coarse woody debris guidelines established in the Forest-wide Assessment for Late Successional Reserves and Managed Late Successional Areas for the Wenatchee National Forest (USDA Forest Service 1997b). Under these guidelines, mitigation for dry forest habitats requiring green tree replacement needs one to three snags per acre, 10 to 14 inches dbh; one to two snags per acre, 15 to 19 inches dbh; and 1.5 snags per acre greater than 20 inches dbh. Three to seven downed logs per acre are also required.

### **3.5.2.3 Alternative 2 - No Action**

Under the No Action alternative no transmission line or associated structures would be constructed. This alternative would, therefore, have no direct or indirect effects on any wildlife species and the conditions described for each species in the Affected Environment discussion, including those associated with BPA's operation and maintenance of the existing BPA transmission lines, would continue unaffected.

### **3.5.2.4 Cumulative Effects**

This section considers the incremental effects of the proposed alternatives when added to other past, present, and reasonably foreseeable future actions. Past and present actions affecting wildlife in the analysis area are discussed in the affected environment portion of this section. This includes the operation and ongoing maintenance of the existing BPA transmission lines and, as a result, the direct and indirect effects analysis assesses the potential impacts of the Proposed Action in conjunction with these existing lines. Projects are considered reasonably foreseeable in time if a plan or permit application has been filed with the county (for private lands) or they are identified as proposed or in progress by the responsible land management agency (for public lands). Reasonably foreseeable future actions are defined for the purposes of this analysis as future actions that are planned within or in the immediate

vicinity of the project area. This area is generally defined for this analysis as the area within one mile of the Proposed Action. Where appropriate, wider analysis areas were considered for the preceding direct and indirect analyses for individual species. For example, potential impacts were considered for grizzly bears at the BMU scale, for lynx at the LAU scale, and for mule deer at the scale of winter range units. However, given that little effect to grizzly bears and negligible or no effects to lynx are anticipated, given that the project will not change the level of human influence within the analysis area, and given that the estimated project-related disturbance comprises a very minor portion of the mule deer winter range units, focusing the identification of cumulative effects within one mile of the Proposed Action remains appropriate these species.

The reasonably foreseeable actions included in this analysis are discussed in Section 3.1. These actions include the Crum Canyon Interface Fire Hazard Reduction project, the ongoing Shadow Ridge housing development located south of the proposed switchyard site, and planning permit applications for modifications to or construction of single-family residences within one mile of the Proposed Action.

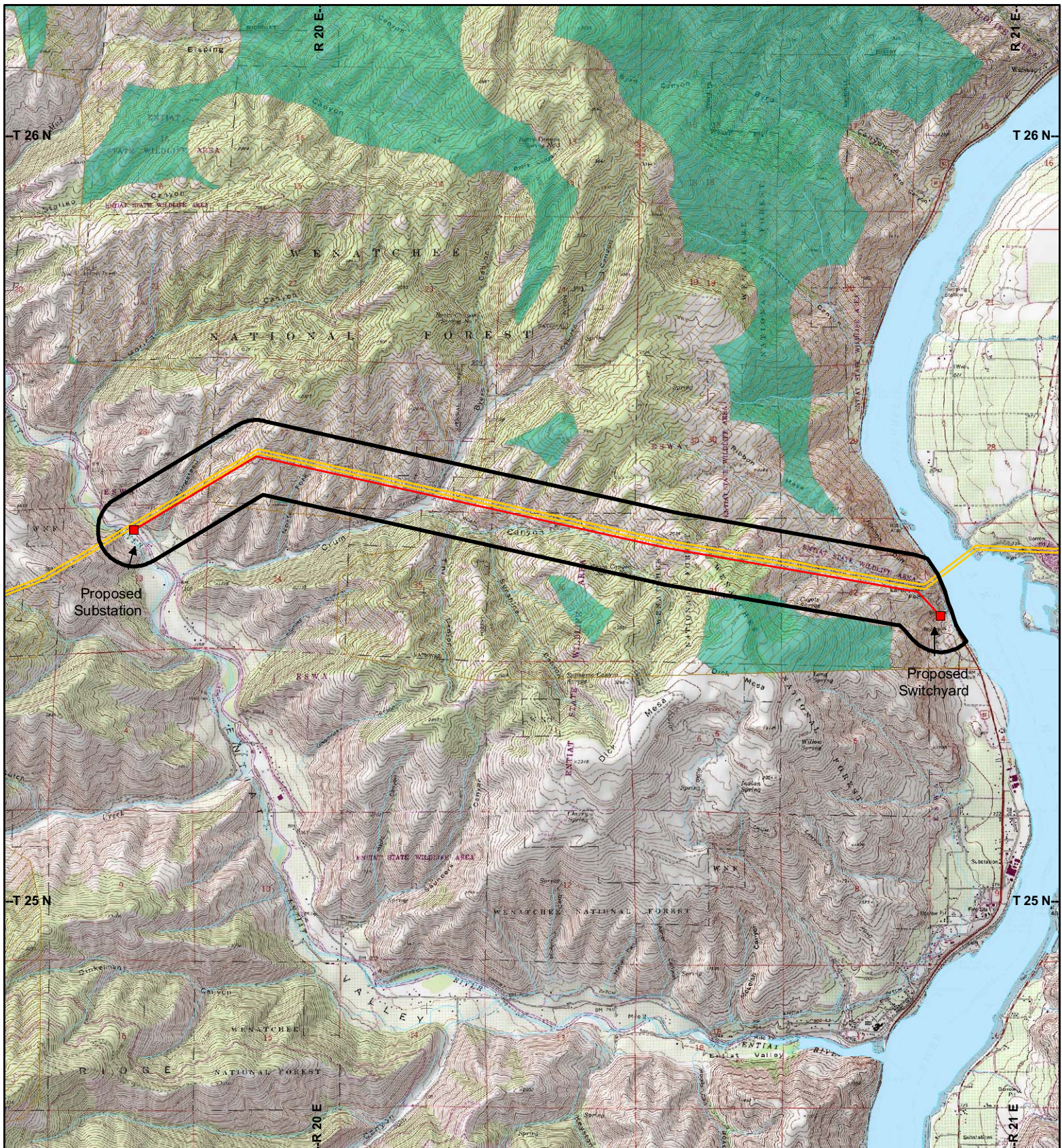
Construction of the transmission line and associated structures would occur in an area that has already been altered by road building and rural development, and would follow the existing BPA transmission line for its entire length. The presence of roads is generally believed to have a large impact on many wildlife species through disturbance from human activity, increased landscape fragmentation, and the creation of travel barriers, the direct loss of native habitat, and the spread of noxious weeds. The existing BPA transmission line has a well-developed access road system and is near major roads including State Highway 97 Alternate to the east and Entiat River Road to the west. The temporary access trails proposed under Alternative 1 would represent a minor addition to the existing road system, which would be mitigated by controlling noxious weeds, revegetating areas within key habitats impacted by the project, minimizing long-term ground disturbance, and implementing various measures to minimize the effects of human disturbance to wildlife (e.g., construction timing).

As described above, taking into account existing roads and the proposed temporary access trails, Alternative 1 would maintain the existing low or moderate levels of human influence in the grizzly bear management unit, deer winter range units, and fifth-field watersheds that encompass the analysis area. Maintenance of the existing BPA line would continue into the future, as would construction activity within the Shadow Ridge housing development and on private properties located within the analysis area. Operation and maintenance of the proposed transmission line under Alternative 1 would contribute a minor amount of human activity in the analysis area and result in a negligible contribution to the cumulative effects of human activity in the analysis area.

The reasonably foreseeable fire hazard reduction project on NFS land would have variable effects on wildlife, benefiting some species more than others, by altering forest structure and composition. In areas of past timber harvest the age class has shifted toward younger forest with smaller trees, which can reduce the amount of habitat available for species associated with mature forest conditions. In areas that have undergone years of fires suppression, projects such as the Crum Canyon project, which would involve the removal of understory brush and small densely stocked trees, would ultimately reduce forest fuel loads and improve overall forest health. Tree removal in both young and mature forests opens the forest canopy, allowing light to penetrate the forest floor and increasing growth of herbaceous understory vegetation. Dead and dying trees left in place provide important nesting, denning, foraging, and roosting habitat for a variety of wildlife species including cavity nesters, furbearers, and small mammals.

Further, given the minor amount of tree removal proposed under Alternative 1 for this project, mitigation measures such as retaining snags within and adjacent to the ROW that do not pose a safety hazard, creating new snags, and leaving downed wood within the ROW and adjacent areas, the project is not anticipated to add to the cumulative loss or alteration of forest in the analysis area. Overall, considered

together with these past, present, and reasonably foreseeable future actions the cumulative effect of the Proposed Action on wildlife is expected to be low.



#### Legend

- Existing BPA 345 kV and 500 kV Power Line Corridor
- Proposed Transmission Line
- Streams
- Roads
- Proposed Action 1/4 Mile Buffer

Grizzly Bear Management Unit (GMU)

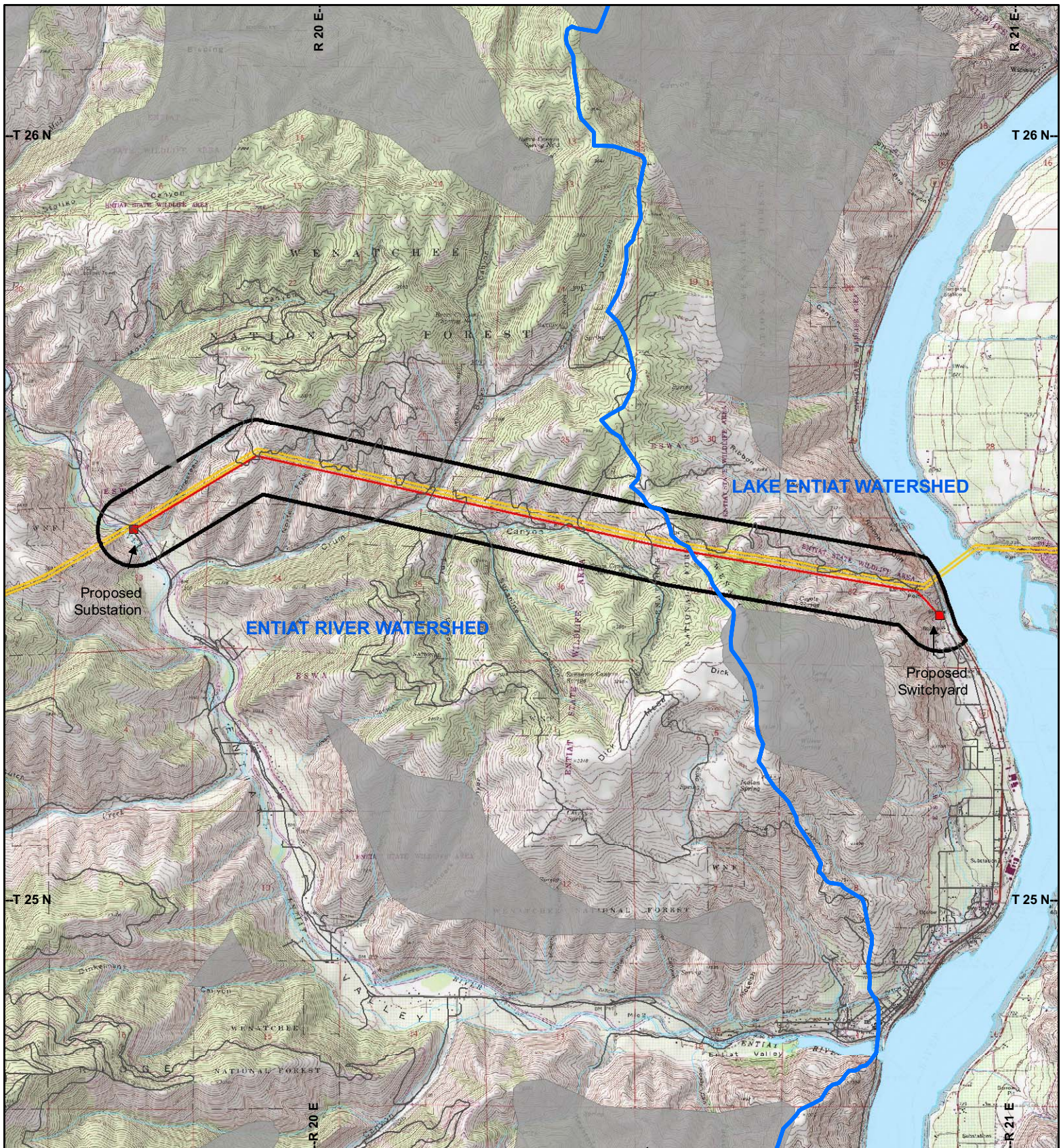
Grizzly Bear Core Habitat

Grizzly Bear Core Habitat defined as land > 1640 feet from a road within GMU.

**Figure 3.5-1 Grizzly Bear Habitat**  
Entiat 115 kV Transmission Line Program



0 0.5 1 Miles



#### Legend

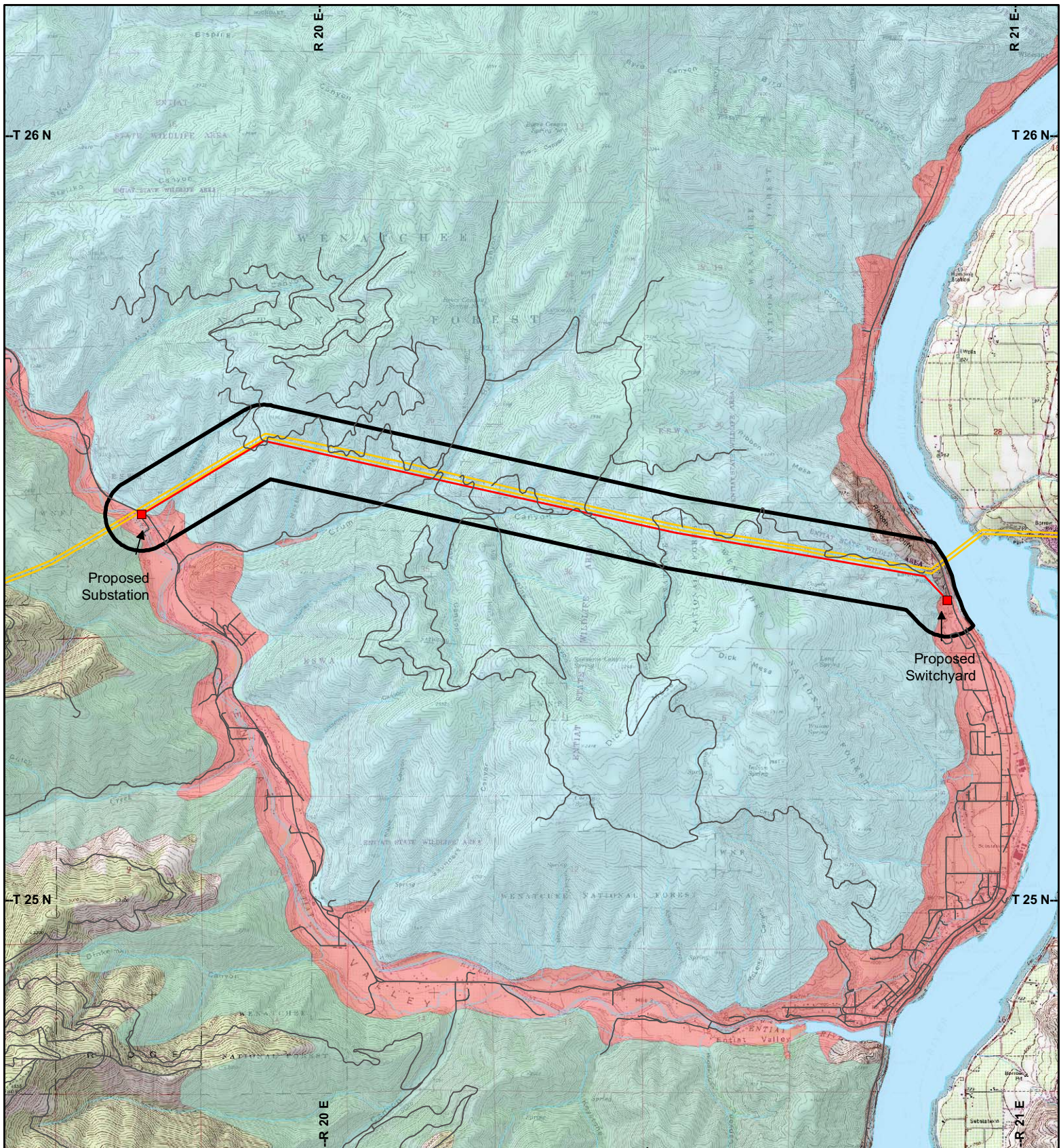
- Existing BPA 345 kV and 500 kV Power Line Corridor
- Proposed Transmission Route
- Streams
- Roads
- Proposed Action 1/4 Mile Buffer
- HUC 5 Watershed Unit

Gray Wolf Core Habitat  
Gray Wolf Core Habitat defined as land with a road density of less than 1 mile per square mile.

Figure 3.5-2 Gray Wolf Habitat  
Entiat 115 kV Transmission Line Program



0 0.5 1 Miles



#### Legend

- Existing BPA 345 kV and 500 kV Power Line Corridor
- Proposed Transmission Line
- Streams
- Roads
- Proposed Action 1/4 Mile Buffer

- Columbia-Entiat Mule Deer Winter Range
- Chelan County Deer Winter Ranges (Historic)
- Swakane Canyon Mule Deer Winter Range

**Figure 3.5-3 Deer Winter Range**  
Entiat 115 kV Transmission Line Program



0 0.5 1 Miles

## **3.6 LAND USE AND RECREATION**

### **3.6.1 Affected Environment**

The proposed alternatives evaluated within this Environmental Assessment (EA) are located in Chelan County. The analysis area for the purposes of this discussion includes the area within one-quarter mile of the proposed transmission line route (Figure 3.1-1). No issues were identified with respect to land use or recreation during public scoping and review by the Interdisciplinary (ID) Team. The following sections describe the general project area, identify applicable land use documents, discuss land use and recreation within the project area, and briefly summarize future land use trends.

#### **3.6.1.1 Project Area Setting**

Federal agencies manage approximately 71 percent of the land in Chelan County, with approximately 70 percent of the county located within the Wenatchee National Forest (McGinnis et al. 1997). Approximately 112,000 acres or 6 percent of the county was identified as agricultural land in 2002 (U.S. Census of Agriculture 2002).

Lands within the project area are typically forested with ponderosa pine associations at elevations above 1,500 feet. Below this elevation, vegetation typically consists of grass, shrubland, or shrub-steppe associations. Much of the flat level ground in the Entiat Valley has been converted into agricultural use. Two main water bodies exist within the project area: the Columbia River to the east, and the Entiat River to the west of the proposed transmission line and associated facilities.

Chelan County is the third largest county in Washington in terms of land area, with an average population density of 22.8 persons per square mile compared to a state average of 88.6 persons per square mile (U.S. Census Bureau 2007a). The city of Entiat had an estimated population of 1,130 in 2007 (Washington State Office of Financial Management [OFM] 2007a). There are no areas meeting the U.S. Census Bureau's definition of urban (population greater than 2,500 or persons) within the analysis area, which generally includes a quarter-mile buffer or corridor around the proposed transmission line route. The closest major urban areas to the analysis area are Wenatchee located approximately 18 miles south of the analysis area with an estimated population of 30,270 in 2007 and Chelan located approximately 18 miles north with an estimated 2007 population of 3,835 (Washington OFM 2007a).

Chelan County and the Entiat Valley area offer a variety of outdoor recreation opportunities, including hiking, mountain biking, motorized, and equestrian trails, developed and remote campgrounds, and day use and trailhead facilities, as well as cross country skiing and snowmobiling opportunities in the winter.

#### **3.6.1.2 Land Use Planning Documents**

A number of federal, state, and local agencies have management authority for parts of the analysis area. These include Chelan County, U.S. Department of Agriculture (USDA) Forest Service, Bureau of Land Management (BLM), Washington State Department of Natural Resources (WDNR), and Washington State Department of Fish and Wildlife (WDFW). The documents that direct land use goals, policies, and ordinances for portions of the analysis area are listed below by agency:

##### **Chelan County**

- Chelan County Comprehensive Plan, last amended in 2005 (Chelan County 2005)

##### **Wenatchee National Forest**

- Wenatchee National Forest Land and Resource Management Plan 1990 (USDA Forest Service 1990)

## Bureau of Land Management - Spokane District

- Spokane Resource Management Plan and Amendments, Record of Decision (ROD) 1987 and 1992 (BLM 1992)

Additional information on the applicable laws and regulations and management direction for Federal lands (National Forest System [NFS] and BLM) is provided in Section 1.6 of this EA.

### 3.6.1.3 Land Use and Management within the Analysis Area

The majority of land within the analysis area is managed by federal or state agencies, with private lands accounting for only 18 percent of the area (Table 3.6-1). The USDA Forest Service is the largest land manager within the analysis area, managing approximately 49 percent of the land within the analysis area. WDFW, BLM, and WDNR manage 12.6 percent, 11.1 percent, and 9.9 percent of the land within the analysis area, respectively (Table 3.6-1).

State Highway 97 Alternate (Highway 97A) runs north-south along the west side of the Columbia River and borders the east side of the proposed switchyard site. Entiat River Road forms the east border of the proposed substation site on the west side of the analysis area. There is limited access to the rest of the analysis area, with access provided in the east portion of the analysis area via Crum Canyon and Osburn Roads.

**Table 3.6-1.** Land Ownership in the Analysis Area

Ownership	Acres	Percent of Total Analysis Area
USDA Forest Service	947	48.5
WDFW	246	12.6
BLM	216	11.1
WDNR	194	9.9
Private	351	18.0
<b>Total</b>	<b>1,954</b>	<b>100.0</b>

### Chelan County Land Use and Zoning Classifications

Portions of the proposed transmission line cross private lands (0.9 mile in total) that are regulated by Chelan County. Zoning regulations are used to guide growth and development in Chelan County in accordance with the Chelan County Comprehensive Plan. The proposed analysis area is located within three main zoning districts: Commercial Agricultural Lands (AC), Rural Residential/Resource Areas (RR), and Urban Growth Areas (UGA) (Table 3.6-2).

Land zoned AC, which allows the development of one dwelling unit per 10 acres, comprises approximately 91 acres or 4.7 percent of the analysis area. Approximately 12 percent of the analysis area is zoned RR, with RR10, which allows the development of one dwelling per 10 acres, accounting for 6 acres. Approximately 1.1 percent of the analysis area is zoned UGA and appears to encompass the Shadow Ridge subdivision that is partially developed south of the proposed switchyard site (Table 3.6-2).

The overall purpose of the three zoning districts is as follows:

- **UGA.** An area designated for higher density urban growth where adequate public facilities and services exist; used to discourage urban sprawl.
- **AC.** Areas intended to conserve commercial and agricultural lands. Encourage existing and future agricultural land uses as a viable use of land and as a significant economic activity.

- **RR.** These areas function as a transition zone between resource lands and areas of more intense rural or urban development.

**Table 3.6-2.** Chelan County Zoning Districts within the Analysis Area

Ownership	Acres	Percent of Total Analysis Area	Percent of Private Land in the Analysis Area
Commercial Agricultural Lands (AC)	91	4.7	25.9
Rural Residential/Resource Areas (RR10)	118	6.0	33.6
Rural Residential/Resource Areas (RR20)	63	3.2	17.9
Rural Residential/Resource Areas (RR5)	58	3.0	16.5
Urban Growth Areas (UGA)	21	1.1	6.0
<b>Total</b>	<b>351</b>	<b>18.0</b>	<b>100</b>
Source: Chelan County 2005			

### USDA Forest Service—Wenatchee National Forest

Approximately 950 acres or 49 percent of the proposed analysis area is located within the Wenatchee National Forest (Table 3.6-1). The Wenatchee National Forest is managed in accordance with the 1990 Wenatchee National Forest Land and Resource Management Plan (Forest Plan), as amended by the Northwest Forest Plan, which sets overall management direction for the Forest in Forest-wide standards and guidelines (USDA Forest Service 1990).

The portions of the Wenatchee National Forest within the analysis area are managed in accordance with the 1990 Forest Plan under the EW-1, Key Deer and Elk Habitat and UC-1, Utility Corridor Management Prescriptions (USDA Forest Service 1990). The goals of these Management Prescriptions are summarized in Table 3.6-3 and described below.

**Table 3.6-3.** USDA Forest Service Management Prescriptions

Management Prescription	Goal Statement
EW-1: Key Deer and Elk Habitat	Manage deer and elk winter range to meet habitat requirements for sustaining optimum carrying capacity
UC-1: Utility Corridors	Provide and manage utility corridors to accommodate energy transmission needs
Source: USDA Forest Service 1990	

**EW-1.** The 1990 Forest Plan identifies deer and elk winter ranges as generally on the edge of the Forest, adjacent to or interspersed with other land ownerships, at low elevations on south- and/or east-facing slopes with reduced snow depth and early snow melt-off. Utility corridors are permitted subject to the determination of need and requirements to protect big game habitat (USDA Forest Service 1990, IV-118).

**UC-1.** This prescription is identified as applicable to existing and potential utility and transmission corridors and includes the land directly under and adjacent to the existing pipeline or electric transmission facility. Compatible facilities are combined in the same corridor whenever possible.

### Bureau of Land Management—Spokane District Office

The analysis area includes approximately 216 acres of BLM lands that are managed under the Spokane Resource Management Plan (BLM 1992). The proposed transmission line would cross two small parcels of BLM lands. Both of these parcels are within the Spokane Resource Management Plan's Scattered Tracts Management Area and managed for multiple uses.

## **State Agency Land**

Land managed by WDFW and WDNR accounts for 12.6 percent (246 acres) and 9.9 percent (194 acres) of the analysis area, respectively. The WDFW lands are part of the Entiat State Wildlife Area, which was established as mitigation for the Rocky Reach hydroelectric project. The majority of WDNR lands are held in a trust created by federal and state laws and are typically managed to provide financial support to designated beneficiaries. Use of the WDNR-managed lands in the analysis area is primarily limited to timber use at this time (Fromherz 2007).

### **3.6.1.4 Recreation**

There are no developed recreation facilities within the analysis area. There are also no hiking or other recreation trails on the public lands in the vicinity of the Proposed Action and dispersed recreation use of the area is generally believed to be low. Exceptions include early spring, following snow melt, when open pine areas in the immediate project vicinity are popular places to look for shed antlers. The area also receives heavier than usual recreation use during the fall hunting season. There are no known hunting camps along the existing transmission corridor, but hunters walk the ridges. Existing access roads receive some off-highway vehicle (OHV) use, as well as use by snowmobiles in the winter, but most of this use occurs west of Crum Canyon.

### **Recreation Opportunity Spectrum**

Recreation on NFS lands is managed under the Recreation Opportunity Spectrum (ROS) system, which helps identify, quantify, and describe the wide variety of available recreation settings. The ROS system arranges the possible combination of activities, settings, and probable experience opportunities across a continuum that consists of seven classes and ranges from Primitive to Urban (Table 3.6-4; USDA Forest Service 1990, IV-29). Lands allocated to EW-1 are managed in a Semi-Primitive Non-Motorized (SPNM) to Roaded Modified (RM) ROS; lands allocated to UC-1 are managed in the ROS range of RM to Urban (U) (USDA Forest Service 1990). The NFS lands within the immediate analysis area are allocated to the Roaded Natural ROS setting.

### **3.6.1.5 Land Use Trends**

According to the Chelan County Planning Department a number of permit applications are on file with respect to residential properties within the analysis area, but, with the exception of the ongoing Shadow Ridge development located south of the proposed switchyard site, there are no projects larger than a single-family residence planned in the vicinity of the proposed transmission line and associated facilities (Nelson 2007). The Shadow Ridge development currently includes approximately 10 single family residences and five lots located on the south side of the development that have not yet been sold (Whitehall 2008). A map showing the location of this development is included in Appendix A to this document.

Residential and other development potential is limited within the analysis area because most of the land is federally- or state-owned and managed. Most of the private development within the area is limited to private lands located along Entiat River Road and Crum Canyon Road on the west side of the analysis area and the Shadow Ridge subdivision and other residential areas located south along Highway 97A from the proposed switchyard site.

**Table 3.6.4. Recreation Opportunity Spectrum Settings on the Wenatchee National Forest**

<b>ROS</b>	<b>Description</b>
Primitive	An area characterized by an environment essentially natural and unmodified by human influence and development. High probability of experiencing solitude and isolation from the sights and sounds of human activity. The area is located at least 3 miles from all roads, railroads and trails with motorized use, and is at least 5,000 acres in size. Few people will be seen or encountered here and regimentation and on-site controls are few.
Semi-Primitive Non-motorized	An area characterized by a predominantly natural or natural appearing environment. High probability of experiencing solitude and isolation. The area is located at least 1/2 mile, but not generally further than 3 miles, from all roads, railroads and trails with motorized use. The area is at least 2,500 acres in size. Other people may be seen or encountered in this area, but not frequently. On-site controls and regimentation will be present but subtle.
Semi-Primitive Motorized	An area characterized by a predominantly natural or natural appearing environment. Evidence of other users, but concentrations of users are low. Moderate probability of experiencing isolation and solitude. The area is located within one-half mile of primitive roads or trails used by motor vehicles, but not closer than 1/2 mile to roads of a higher standard than primitive. The area is at least 2,500 acres in size. Other people will be seen or encountered in this area, but not frequently. On-site controls and regimentation will be present but subtle.
Roaded Natural	An area predominantly natural appearing. Vegetation management and resource modifications are present but harmonize with the natural environment. A moderate opportunity exists for isolation and undisturbed activities. The area is located within 1/2 mile of better than primitive roads and railroads. On-site regimentation and controls are generally noticeable.
Roaded Modified	An area that is generally natural appearing but has significant vegetation management and resource modification. Modifications generally harmonize with the natural environment. A moderate opportunity exists for isolation and undisturbed activities. The area is located within 1/2 mile of better than primitive roads and railroads. There is a moderate to high probability of contact with other people on roads; low to moderate probability off roads and on trails. On-site regimentation and controls are generally noticeable.
Rural	An area characterized by a substantially modified natural environment. Vegetation management and facility development is dominant. Moderate to high frequency of contact with other users in developed sites, on roads and trails, and on water surfaces. Many facilities are present to handle groups as well as individual users. Regimentation and managerial controls are numerous; but largely in harmony with the natural environment.
Urban	An area characterized by a substantially urbanized environment, although the background areas may have natural appearing elements. Developed sites have the highest standard of development with many user conveniences. The setting is strongly structure dominated. Large numbers of users are present on site and in nearby areas. Regimentation and managerial controls are obvious and numerous.
Note: ROS – Recreation Opportunity Spectrum Source: USDA Forest Service 1990	

### 3.6.2 Environmental Effects

This section assesses the potential effect of the proposed alternatives on land use and recreation. The following discussion is divided into three sections that identify the evaluation criteria used in this analysis and discuss the effects of Alternative 1 – Proposed Action, and Alternative 2 – No Action, respectively. The cumulative effects of the proposed alternatives are evaluated in Section 3.6.2.4. Direct, indirect, and cumulative effects are defined in Section 3.1 of this document.

### 3.6.2.1 Evaluation Criteria

The following section addresses the potential effects of Alternative 1 – Proposed Action on land use and recreation and considers the following evaluation criteria with respect to general land use:

- Total miles crossed by land ownership
- Number of easements and permits required and compatibility with existing management and zoning regulations

The evaluation criteria for recreation consider potential functional and experiential impacts. Functional impacts pertain to the physical use of a particular site or area for recreational purposes. Experiential impacts consider potential impacts to the experience and expectations of the user when recreating in a particular area. Potential impacts would be considered significant if they:

- Permanently precluded the use of or access to a recreation facility or a particular recreation activity in the analysis area
- Improved access to a previously difficult to access area or provided OHV access to areas previously used for non-motorized activities
- Permanently or negatively affected a substantial portion of an existing recreation activity and/or ROS setting on NFS lands

### 3.6.2.2 Alternative 1 – Proposed Action

#### Land Ownership

The proposed transmission line would cross public lands managed by the USDA Forest Service (2.6 miles), BLM (0.4 mile), WDNR (1 mile), and WDFW (0.9 mile). The remainder of the line (0.9 mile) would cross private lands (Table 3.6-5). Table 3.6-5 also identifies the area that would be located within the proposed 140-foot right-of-way (ROW) by land ownership. ROW acquisition and clearing is discussed in detail in Section 2.4-1 of this document.

**Table 3.6-5.** Total Affected Miles and ROW Area by Land Ownership

Ownership	Miles	ROW Area (acres) <sup>1/</sup>	Percent of Total
USDA Forest Service	2.6	44	45
WDFW	0.9	15	16
BLM	0.4	7	7
WDNR	1.0	17	17
Private	0.9	15	16
<b>Total</b>	<b>5.8</b>	<b>98</b>	<b>100</b>
Notes: ROW – right-of-way 1/The ROW area was estimated by multiplying the linear distance by the ROW width of 140 feet. ROW clearing and acquisition is discussed in Section 2.4-1 of this document.			

#### Easements and Permits

The proposed project would require a Special Use Permit from the USDA Forest Service, a ROW grant from BLM, and easements from WDNR and WDFW. Easements would also be required for five private parcels from four private land owners.

## USDA Forest Service

The portion of the Wenatchee National Forest that would be crossed by the proposed transmission line is presently managed under the EW-1, Key Deer and Elk Habitat and UC-1, Utility Corridor Management Prescriptions (USDA Forest Service 1990). The proposed transmission line would be consistent with the current Forest Plan because the proposed transmission line would be located adjacent to the existing transmission corridor associated with the existing Bonneville Power Administration (BPA) 345 kilovolt (kV) and 500 kV lines that cross NFS lands in this area. The description of the UC-1 Management Prescription notes that compatible facilities should be combined in the same corridor whenever possible. The Lands Standards and Guidelines applicable to both UC-1 and EW-1 also state that new utility proposals should be accommodated within existing corridors to the maximum extent possible (USDA Forest Service 1990, IV-100). In addition, utility corridors are permitted in EW-1 subject to the determination of need and requirements to protect big game habitat (USDA Forest Service 1990, IV-118).

## Bureau of Land Management

The proposed action alternative would cross two parcels of BLM land. Both parcels are within the Spokane Resource Management Plan's Scattered Tracts Management Area and managed for multiple uses (BLM 1992). Although no formal transportation/utility corridors have been designated on the BLM public lands that would be crossed by the proposed transmission line, the Spokane RMP generally allows transmission line corridors when compatible with other resource values and uses. The proposed transmission line would be located adjacent to the existing BPA 345 kV and 500 kV lines that cross BLM lands in this area and would, therefore, be consistent with resource values and uses in these areas. This existing corridor is identified as a locally-designated, electric-only, upgrade-only, transmission corridor in the Designation of Energy Corridors on Federal Land in the 11 Western States Programmatic Draft EIS (U.S. Department of Energy and BLM 2007).

## Private Property

Less than one mile of the proposed transmission line would cross private lands under Alternative 1. The lands that would be crossed are zoned AC or RR (Table 3.6-6). The majority of the land zoned RR is RR10. The proposed substation and switchyard sites are located on private lands zoned AC and RR5, respectfully. A Conditional Use Permit would be required from Chelan County to construct the proposed facilities in these locations, as well as for the portions of the proposed transmission line that cross private property (Nelson 2007).

**Table 3.6-6. Land Use Zoning**

<b>Zoning District</b>	<b>Miles</b>
Commercial Agricultural Lands (AC)	0.34
Rural Residential/Resource Areas (RR10)	0.51
Rural Residential/Resource Areas (RR20)	0.02
Rural Residential/Resource Areas (RR5)	0.03
<b>Total</b>	<b>0.90</b>

## Encroachment Permits

Traffic would need to be controlled where the proposed transmission line crosses highways. The Public Utility District No. 1 of Chelan County would obtain temporary encroachment permits from the Washington State Department of Transportation and Chelan County to cross Entiat River Road during project construction. The request for an encroachment permit would require a plan for traffic management including proposed dates and times for traffic closures.

## **Recreation Facilities and Activities**

There are no developed recreation facilities within the analysis area. Dispersed recreation uses within the analysis area include hunting during the fall deer season. The archery deer season begins in September, with the firearm season beginning mid-October. Project construction would likely still be ongoing at these times, but potential impacts would be localized and temporary, and limited to one deer season. While some hunters might be temporarily displaced, the number is expected to be relatively small and displaced hunters would likely be displaced to other nearby locations still within Game Management Unit 247-Entiat.

There would be no impacts to people looking for shed antlers in spring or dispersed winter recreation activities, such as snowmobiling.

## **Recreation Experience**

Construction activities would have short-term effects on some dispersed recreation activities, as noted in the preceding section. The presence of construction crews and equipment, as well as the noise associated with construction activities, would likely affect the recreation experience of some users in the area. These potential impacts would, however, be localized and temporary.

## **Recreation Opportunity Spectrum**

The NFS lands that would be crossed by the proposed alternative are allocated to the Roaded Natural ROS setting (Table 3.6-4). This allocation is consistent with the ROS management requirements established for EW-1 and UC-1 and would not be altered by Alternative 1.

### **3.6.2.3 Alternative 2 – No Action**

Alternative 2 – No Action would not involve any new construction and would therefore have no direct or indirect effects on land use or recreation and the existing conditions described in the Affected Environment part of this section would continue unaffected.

### **3.6.2.4 Cumulative Effects**

This section considers the incremental effects of the proposed alternatives when added to other past, present, and reasonably foreseeable future actions. Past and present actions affecting resources are included in the affected environment portion of this section. This includes the operation and ongoing maintenance of the existing BPA transmission lines and, as a result, the direct and indirect effects analysis assesses the potential impacts of the Proposed Action in conjunction with these existing lines.

Reasonably foreseeable future actions are defined for the purposes of this analysis as future actions that are planned within or in the immediate vicinity of the project area (defined for this analysis as the area within one mile of the Proposed Action). Projects are considered reasonably foreseeable in time if a plan or permit application has been filed with the county (for private lands) or they are identified as proposed or in progress by the responsible land management agency (for public lands).

The reasonably foreseeable actions included in this analysis are discussed in Section 3.1. These actions include the Crum Canyon Interface Fire Hazard Reduction project, the ongoing Shadow Ridge housing development located south of the proposed switchyard site, and planning permit applications for modifications to or construction of single-family residences within one mile of the Proposed Action.

The Crum Canyon Interface Fire Hazard Reduction project would meet all applicable Forest Plan standards and guidelines intended to protect existing natural resources and land uses. Ongoing and future residential development in the vicinity of the Proposed Action is assumed to meet all local, county, and state planning regulations and ordinances. The population in Chelan County increased at a faster rate than the state as a whole in the 1990s and has continued to grow since 2000, but at a slower rate.

Population is projected to continue to grow in Chelan County over the next decade. The identified capacity deficiency that this project is designed to address was identified based on projected electrical demand in the valley. Correcting this deficiency would increase the reliability of the electrical supply in the area but is not expected to substantially alter existing or projected land use patterns.

While the Crum Canyon Interface Fire Hazard Reduction project would likely have short-term effects on dispersed recreation experiences within and in the immediate vicinity of the 40 acres that would be thinned under that project, this project and the associated effects are scheduled to occur in 2008 and would not coincide in time with, or add incrementally to, the potential short-term disturbances that would be associated with construction of the Proposed Action, which would start in 2009 (depending on various approvals including budgetary approval by the District).

## 3.7 VISUAL RESOURCES

### 3.7.1 Affected Environment

This section presents an assessment of the existing visual resources within the project area. Comments made by the public and government agencies during public scoping for this project identified the following issues with respect to visual resources:

- Light generated by the proposed switchyard could affect nearby residents.
- Construction activities and the introduction of permanent structures could affect the quality of existing views from State Highway 97 Alternate (Highway 97A), which is part of the Cascade Loop Scenic Byway, as well as the views from the Columbia River and Entiat River Road.

The following sections provide an overview of the visual resources in the project area and a baseline against which the potential effects of the proposed alternatives may be measured. The following sections describe existing visual conditions in the project area and the visual quality objectives established for the potentially affected National Forest System (NFS) lands. The analysis area for visual resources generally includes a quarter-mile buffer or corridor around the proposed transmission line route, which encompasses all project-related activities, including the temporary trails and laydown areas.

#### 3.7.1.1 Existing Visual Conditions

##### Visual Setting

The visual setting for the analysis area consists of three distinct landscapes that form the basis for this assessment: the Columbia River valley, the Entiat River valley, and the upland area in between, referred to here as the Entiat upland area. The following sections provide an overview of the existing visual conditions in these areas.

##### *Columbia River Valley*

The Columbia River is a dominant landscape feature that offers scenic views from the Highway, it is a major attraction for seasonal recreation activities of water sports, developed camping and day use activities. The landscape character of the Columbia River Valley is urban to rural near the community of Entiat with some agricultural character mixed in.

The Columbia River valley is a major regional transportation corridor and is paralleled by state highways on either side in the vicinity of the analysis area, as well as a railroad track immediately adjacent to Highway 97A along the west side of the river. Highway 97A is part of the Cascade Loop Scenic Byway, a 400 mile loop that extends from the Puget Sound region across the Cascade Mountains and along the Columbia River valley. Points of interest along this byway identified in the vicinity of the analysis area are Rocky Reach Dam and Lake Chelan (Washington State Tourism 2007).

The valley is bound to the west by moderately to often severely sloping hills and mountainsides. Prominent rock outcrops are common. The transmission line proposed under Alternative 1 would originate immediately south of Earthquake Point, a mountainous outcrop that marks the narrowing of the river valley and is believed to be the site of an historic earthquake that caused a rockslide of large enough magnitude to temporarily halt the flow of the Columbia River. The exposed, steep south-facing rocky slope forms a backdrop to the proposed switchyard and the first transmission line structure that would be located on a prominent outcrop near the top of the slope. The steep slope exhibits a marbled texture of stone grays, with green, gray-green, and tan colors associated with existing vegetation, which ranges from scrub-shrub and exposed soil to small bushes and individual coniferous trees.

Vegetation along the west side of the highway is characterized by a mixture of predominately coniferous trees, and hedgerows typically characterized by a pyramidal (evergreen) form. Other vegetative cover is generally low, scrub-shrub with open, irregular form and light gray-green and tan colors.

The existing Bonneville Power Administration (BPA) 345 kilovolt (kV) and 500 kV transmission lines and associated metal lattice structures are the dominant manmade features in the immediate analysis area. These transmission lines trend east to west and span the Columbia River at this location, with the first structures on the west side of the river located on top of the outcrop that marks Earthquake Point. The first lattice transmission line structure located on the outcrop is painted red and white to increase its visibility and is, as a result, visible for more than a mile to approaching northbound traffic on Highway 97A.

Other manmade modifications in the vicinity of the analysis area include the existing Rocky Reach to Chelan 115 kV transmission line that parallels the west side of the highway. This existing line, strung on single wood pole structures, transfers electricity north from Rocky Reach Dam, located about 10 miles downriver, to the city of Chelan, located about 20 miles north of the analysis area. The switchyard proposed under Alternative 1 would switch power from this line to a new proposed transmission line that would serve customers in the Entiat Valley.

Areas of residential development occur south of the analysis area and include the Shadow Ridge housing development located on the west side of the highway, and private residences located east of the highway, between the railroad tracks and the Columbia River. The Columbia Breaks Fire Interpretative Center is located south of Shadow Ridge, also on the west side of the highway.

### ***Entiat River Valley***

The Entiat River valley is generally flat to gently rolling and bounded by steeply sloping hills and mountainsides. The landscape character of the Entiat Valley on private lands is rural to agricultural and transitions to natural appearing as more distance is traveled up the valley toward NFS lands. The Entiat River, the dominant water feature in the valley, flows in broad meanders that are often sharply curvilinear. Entiat River Road parallels the east side of the river providing access to the farms and single-family residences in the valley. The river itself is not visible from the road in many locations, but its presence is marked by the trees and bushes that line its banks. These trees are generally taller than the cultivated agricultural lands that are located either side of the river and extend east of Entiat River Road. The irrigated flatlands of the valley in the vicinity of the analysis area are predominantly cultivated and planted with fruit orchards, and generally characterized by short, rounded trees planted in uniform rows. This lush green vegetation contrasts sharply with the vegetative cover on the adjacent steep slopes and mountainsides, which is generally low, tan-brown colored, scrub-shrub interrupted by scattered, sometimes more densely occurring, pyramidal coniferous trees.

The visual landscape in the valley has been substantially altered by irrigated agricultural development. Other man-made features in the vicinity of the analysis area include single-family residences, farmhouses, and other farm buildings. There are also a number of homes along the initial paved section of Crum Canyon Road, south of the analysis area. The existing 34.5 kV electric transmission line that supplies the valley and associated distribution lines follow Entiat River Road, occasionally switching from one side of the road to the other. The town of Ardenvoir is located northwest of the analysis area along Entiat River Road, which also provides access to the Mad River recreation area and the Fox Creek and Silver Falls campgrounds, located some distance northwest of the analysis area.

The existing BPA 345 kV and 500 kV transmission lines and associated metal lattice structures trend east to west through this part of the analysis area, spanning Entiat River Road and the river from hillside to hillside. Two large lattice towers painted red and white to increase their visibility are located adjacent to

one another on a hilltop on the east side of the river. These towers are, however, only visible from a limited number of locations with the curves in the road and the steep intervening topography limiting the area seen by travelers driving northwest or southeast along Entiat River Road.

### ***Entiat Upland Area***

The majority of the proposed transmission line, approximately 5 miles, would be located in the undeveloped, upland area that stretches between the Columbia River and Entiat River valleys described in the preceding sections and referred to here as the Entiat upland area. With the exception of a narrow swath of private land along Crum Canyon Road, the analysis area is public land managed by federal and state agencies (see Figures 2-1 and 2-2, and Section 3.6, Land Use and Recreation).

This area is characterized by steep slopes that exhibit sharply sloping lines and varying shades of tans, browns, and greens. Much of the vegetation is tan and light gray-green colored low scrub-shrub with rows of more upright pyramidal coniferous trees concentrated along ridgelines in the area. The landscape character is natural appearing except for the existing utility corridor and associated facilities which create an unnatural modification to the landscape character.

The existing BPA 345 kV and 500 kV transmission lines and associated metal lattice structures trend east to west through the analysis area and dominate the visual landscape cutting across the sloping topography and forming a distinct east-west corridor. The structure locations and existing access roads are the only manmade features in much of this area. Level ground in the immediate vicinity is mostly associated with construction grading for the existing transmission line towers and access roads.

The steeply sloping terrain and intervening vegetation mean that the existing transmission structures are visible from a limited number of locations, with many of the structures only visible from within or immediately adjacent to the existing corridor. There is some use of the analysis area and the existing access roads and transmission line corridor for recreation purposes (see Section 3.6, Land Use and Recreation), but general human use within the viewshed of the existing transmission structures is limited in these areas.

#### **3.7.1.2 Visual Quality Objectives**

The Wenatchee Land and Resource Management Plan (Forest Plan) delineates management areas that identify desired future conditions and appropriate uses for particular areas on the Wenatchee National Forest (USDA Forest Service 1990). The Forest Plan also establishes visual quality objectives (VQOs) for each management area. These objectives identify standards of visual quality that proposed activities in these areas should meet, and identify five degrees of alteration to the natural landscape based on a landscape's diversity of natural features and the public's concern for scenic quality (Table 3.7-1). Views from Highway 97A, which is part of the North Cascades Cascade Loop, and from the Entiat River Road are scenically valued. NFS lands within the viewsheds of the travel routes are managed for a natural appearing setting where possible. However, NFS lands within the analysis area are not within the viewsheds of either of these identified travel routes.

The proposed transmission line would cross NFS lands allocated to the Key Deer and Elk Habitat (EW-1) Management Prescription and would be adjacent to the existing BPA transmission corridor which is allocated to the Utility Corridors (UC-1) Management Prescription. The VQOs established for EW-1 and UC-1 are Modification and Maximum Modification, respectively (Table 3.7-1).

This management system applies only to NFS lands. There are no VQOs assigned to the other lands that would be crossed by the proposed transmission line.

**Table 3.7-1. Visual Quality Objectives for the Wenatchee National Forest**

<b>VQO</b>	<b>Description</b>
Preservation (P)	Areas in which only ecological change has taken place except for trails needed for access. These areas appear to be untouched by human activities.
Retention (R)	Areas in which changes to the landscape are not visually evident to the average person unless pointed out. These areas appear to be natural.
Partial Retention (PR)	Areas in which changes in the landscape may be noticed by the average forest visitor but do not attract attention. The natural appearance of the landscape still remains dominant.
Modification (M)	Areas in which changes in the landscape are easily noticed by the average forest visitor and may attract some attention. Changes appear to be disturbances but resemble natural patterns.
Maximum Modification (MM)	Areas in which changes in the landscape are strong and would be visible to the average forest visitor. These changes stand out as the dominating impression of the landscape when viewed at close distances, but are shaped so that they might resemble natural patterns when viewed from 3 to 5 miles or further.
Source: USDA Forest Service 1990	

### 3.7.2 Environmental Effects

This section assesses the potential visual impacts of the proposed alternatives. The following discussion is divided into three sections that identify the evaluation criteria used in this analysis and discuss the direct and indirect effects of Alternative 1 – Proposed Action and Alternative 2 – No Action, respectively. The cumulative effects of the proposed alternatives are evaluated in Section 3.7.2.4. Direct, indirect, and cumulative effects are defined in Section 3.1 of this document.

#### 3.7.2.1 Evaluation Criteria

Construction, operation, and maintenance of the proposed action alternative could have short-term and long-term effects on visual resources within the analysis area. The key evaluation criteria used in this assessment are as follows:

- Visibility. Visual impacts are influenced by the estimated degree of project visibility, the distance from which the facility is viewed, and the location of the project in the seen landscape. Degree of visibility pertains to the estimated amount of transmission structures and associated facilities that would be visible. Visibility can be influenced by a proposed facility's proximity and relationship to existing facilities. Where there are high concentrations of dissimilar structure types, or if similar structure types are not located side by side (not synchronized), there is the potential for a higher degree of visibility. As the distance between viewer and proposed transmission facilities increases, the potential for visual impact decreases. Location in the seen landscape may consider silhouetting, extended views, break in an established landscape pattern or edge, inappropriate scale and the position of the viewer.
- Viewer sensitivity. The potential for visual impact is influenced by the number and type of viewers. As the number of viewers increases, the potential for visual impact also increases. Residents are usually sensitive to changes in their surrounding environments and views, as are some recreational users of particular areas. Highway travelers might not be as sensitive because the lines and associated facilities are in view for only a short time while travelers are en route to other locations. This may not, however, be the case with travelers on a scenic highway where viewers might be sensitive to the presence of man-made structures.
- Compatibility with the surrounding landscape. Visual impacts are influenced by the compatibility between the proposed project and the landscape in which it is located. Compatibility may be considered in terms of the form, line, color, and texture of the proposed

facilities and their relationship to the landforms and vegetation of the surrounding landscape. In a forested setting, for example, light-colored structures stand out and appear closer, while dark colors tend to fade into the background and appear further away.

A high level of visual impact would occur when:

- Visibility of the proposed facilities based on the number and amount of each structure seen and the distance from which they can be seen is high.
- Large numbers of sensitive viewers, including motorists, residents, and recreationists, would see the proposed facilities primarily in the foreground of the view.
- Proposed facilities have low compatibility and high contrast with the form, line, color, and texture of the landscape and become a dominant element in the view.

For the portions of the proposed transmission line on Wenatchee National Forest lands, the evaluation of visual impacts also considers whether the proposed action alternative would be consistent with the VQOs established for the affected areas (USDA Forest Service 1990).

### **3.7.2.2 Alternative 1 – Proposed Action**

This alternative would involve the construction of approximately 5.8 miles of a new 115 kV electric transmission line from a new switchyard that would be constructed near Earthquake Point to a new substation that would be located in the Entiat Valley, just north of Crum Canyon.

## **Visual Impacts**

### ***Visual Assessment Points***

The visual resource analysis for the proposed action alternative is based on the analysis of the potential visual impacts from selected visual assessment points (VAPs). Typical VAPs for this type of analysis include:

- Concentrations of viewers such as major roadways or residential areas
- Visually sensitive land uses such as parks and other recreation facilities
- Culturally sensitive locations such as heritage markers, historic sites, or areas to which residents have emotional attachment
- Designated scenic roadways or overlooks
- State/Federal designated trails
- State parks/preserves
- National or state wild, scenic, and recreational rivers.

Analyzing potential visual impacts from a series of VAPs allows the actual viewer experience with the landscape to be considered. Review of a preliminary geographic information system-based viewshed analysis prepared for this project and other important sources of secondary data, including orthophotos, identified two areas where the proposed action alternative would be visible to concentrations of viewers. These areas are the east side of the analysis area from the vicinity of Highway 97A looking north and the west side of the project from Entiat River Road, also looking north. One VAP was selected as representative of a series of similar views in each area. These existing views and visual simulations of the proposed facilities superimposed over the existing views are presented in Figures 3.7-1 and 3.7-2.

The following sections assess the visual impacts of Alternative 1 with respect to the three distinct landscapes identified within the analysis area in Section 3.7.1.1.

## ***Columbia River Valley***

The VAP used to represent this view (Figure 3.7-1) is broadly representative of views along the Highway 97A corridor, including views from the Shadow Ridge subdivision and the Columbia Breaks Fire Interpretive Center. This view is from Highway 97A, north of the turnoff for the Shadow Ridge subdivision.

Three new structures would be visible from this location: the proposed deadend structure located near the highway, a two-pole transmission structure located near the top of the rocky slope, and a three-pole deadend transmission structure located on top of the outcrop, near the second set of BPA structures. The proposed switchyard would also be partially visible from this location. The transmission structures and the deadend structure in the switchyard would have a high-carbon steel coating that would rust brown and help these structures blend in with the existing landscape. As a result the switchyard structure and especially the two-pole structure that would be situated near the top of the slope would tend to blend in with the landscape and only be visible from relatively short distances. The structure on top of the ridge would be silhouetted against the sky and visible from greater distances. This structure would, however, be situated between two existing sets of BPA transmission structures and overall the visual impact would be incremental because it represents an addition to a landscape that has already been visually disturbed by existing facilities that have been in place since the 1940s (Figure 3.7-2). Incremental visual impacts are generally considered less disruptive to the existing landscape.

These structures would be potentially visible to a relatively large number of viewers, with an estimated 3,700 to 4,200 vehicles a day traveling along this stretch of the highway in 2006 (Washington Department of Transportation 2007). Although Highway 97A is part of a scenic highway, the sensitivity of most people driving north to the proposed facilities is expected to be low. Most vehicles travel at fairly high speeds (50 to 60 miles per hour) along this stretch of the highway and the lower two structures shown in Figure 3.7-2 would not be visible from many locations due to intervening vegetation and topography. The three-pole structure on the ridge would be visible from longer distances, but would, as noted above, be compatible with the already existing structures, with the viewer's attention drawn to the existing red and white lattice tower on the edge of the outcrop, rather than the existing (and proposed) structures located farther west along the ridgeline. Closer views of this structure from passing vehicles would be limited due to the height of the structure above the road and the resulting viewpoint angle.

The proposed transmission structures would also be visible to some residents in the Shadow Ridge subdivision and other private residences located south of the proposed switchyard site. The two transmission structures on the slope would be visible from these locations. The view of the proposed lower deadend structure and switchyard would be blocked by the intervening topography and vegetation. The installation of these structures would have an incremental visual impact on those residents, but the overall impact is expected to low due to the degree of compatibility between the proposed structures and the existing natural and man-made landscape.

The Columbia River is a dominant landscape feature that offers opportunities for seasonal recreational opportunities in the vicinity of the analysis area. The proposed three pole structure on the ridge would be visible from limited locations on the river with views from most parts of the river blocked by intervening vegetation and topography, as well as the existing BPA structures. The proposed three pole structure would have an incremental impact on a limited number of views from the Columbia River. In locations where the structure would be visible, the viewer's attention would continue to be drawn to the existing red and white lattice tower on the edge of the outcrop, rather than the existing (and proposed) structures located further west along the ridgeline, with views similar to those shown in Figure 3.7-1.

**Figure 3.7-1. Visual Simulation – Columbia River Valley**

Existing Conditions, View North



Existing Conditions with the Proposed Facilities, View North



**Figure 3.7-2.** Visual Simulation – Entiat River Valley

Existing Conditions, View North



Existing Conditions with the Proposed Facilities, View North



The proposed switchyard site is part of a larger parcel of land that has been disturbed in the past. Access is provided by an existing unpaved road and an unpaved, partially overgrown loop road is located immediately north of the proposed switchyard site. The larger parcel slopes up and away from the road and is characterized by tan shrub-scrub and patchy gray-green vegetative cover, interspersed with some larger trees and bushes, giving the area a generally unkempt and overgrown appearance. Existing single pole 115 kV transmission structures border the east side of the site. Existing vegetation, deciduous trees and bushes, act as a visual buffer and partially shield the proposed site from the highway. The District would retain these trees to provide a natural buffer for the switchyard and limit the visual impact to passing vehicles.

The switchyard would be lighted for security in accordance with the National Electric Safety Code. Shields would be installed so that the light would be directed downward, rather than illuminating the sky. Following construction, traffic visiting the completed switchyard would be limited to routine security inspections which would, on average, be conducted twice a week. These inspections would typically take place during daylight hours. It is possible that emergency maintenance or repair work could be required at the proposed switchyard after daylight hours at some point in the future, but this would be a short-term temporary impact.

### ***Entiat River Valley***

The proposed transmission line would be visible from a limited number of viewpoints in the Entiat Valley. This is currently the case with the existing BPA 345 kV and 500 kV transmission line structures, which are only visible from a limited number of locations, with the curves in the road and steep intervening topography limiting the area seen by travelers driving northwest or southeast along Entiat River Road.

The VAP used to represent the view in this area is looking north from one of the few places where it would be possible to see the proposed transmission structure on the east side of the road without actively looking for it (Figure 3.7-2). The proposed substation site is located on the west side of the road and would be largely shielded by existing vegetation from this location, as shown in Figure 3.7-2.

The transmission structure and the deadend structure in the substation would have a high-carbon steel coating that would rust brown and help these structures blend in with the existing landscape. This would lessen the overall visual impact of the proposed structure in this location, but the degree of compatibility with the natural landscape elements in this area would be low, as the vegetation on this hillside is mainly tan and light brown colored. Further, part of the structure would be silhouetted against the sky from this location. However, while the structure has a low degree of compatibility with the existing natural landscape elements, it is compatible with the existing man-made elements, specifically the lattice metal transmission structures and conductor that have been in place in some form since the 1940s, and as a result, the new structure and conductor would have an incremental impact, as a consistent addition to a landscape that has already been visually disturbed (Figure 3.7-2).

The proposed structure shown in Figure 3.7-2, as well as the next structure to the east, would be delivered and set by helicopter and, therefore, eliminate the need for temporary access roads on these relatively visible slopes and the associated visual impacts.

The proposed substation would occupy about 1.5 acres and consist of a fenced and secured graveled yard containing transformers and switches to accommodate the change from transmission to distribution voltage. The proposed substation site is currently part of a farm and planted with pear trees, shown to the west in Figure 3.7-2. The pear trees that currently occupy the site would be cleared. The site is bordered by Entiat River Road on the east and a private access road to the west. The site sits approximately six feet

below the adjacent road grade, which curves sharply north and south of the site, limiting the number of locations that the proposed substation would be visible from. The Public Utility District No. 1 of Chelan County (District) would further screen the proposed substation from the road using arborvide, which would form a vegetative screen from the road approximately 8 to 12 feet tall.

The substation would be visible for short time periods to vehicles traveling in either direction along Entiat River Road. The substation components would be metallic gray and the substation would have a low degree of compatibility with the surrounding vegetation. The surrounding area on the west side of Entiat River Road has, however, been visually disturbed in the past. The proposed substation site is part of a working farm that includes land cultivated as orchards, a feedlot, outbuildings, and storage sheds. The number of mobile viewers (that is, people traveling along Entiat River Road) is relatively low. There are a limited number of stationary viewers with two residential structures located in the vicinity. The substation would likely be visible from the closest of these structures (the building on the right in Figure 3.7-2).

### ***Entiat Upland Area***

The proposed transmission line would parallel the existing BPA 345 kV and 500 kV lines through this area. The existing transmission line corridor has been present since the 1940s and dominates the otherwise undeveloped landscape in these areas, cutting across the steeply sloping topography and forming a distinct east-west corridor. The existing structures are visible from a limited number of locations, with many of the structures only visible from within or immediately adjacent to the existing corridor. That would also be the case with the transmission line proposed under this alternative. The existing structures are also visible from several residential structures located along Crum Canyon Road. The new structures associated with the proposed transmission line would likely be visible from these locations also.

The proposed structures would be steel with a high-carbon steel coating that would rust brown and help these structures blend in with the existing landscape. The transmission construction would also use non-reflective conductors, as well as non-reflective insulators (i.e., non-ceramic or porcelain insulators). The proposed structures would be spaced the same distance apart as the existing structures and match the existing locations, rather than introducing new structures mid-span between the existing structures. This would reduce the overall visual impact of the structures along the corridor and would also allow the District to use the existing access roads to the full extent possible, which would reduce the visual impact associated with new road construction. These roads would need to be extended in some locations and the resulting temporary access trails would be recontoured and revegetated following the completion of construction.

Visual mitigation in these areas would include limiting vegetation removal to the amount necessary to ensure safe operation of the proposed transmission line (see Section 2.5.8). Existing vegetation including small trees and shrubs that would not interfere with the conductors or safe operation of the proposed transmission line would be preserved within the right-of-way. In locations where vegetation such as danger trees would need to be removed, some trees would be topped and left as snags. Right-of-way clearing is discussed in detail in Section 2.4.1 of this document. The proposed transmission line would require the removal of approximately 175 trees. The long-term effects of vegetation removal could be lessened by trimming the vegetation selectively, where possible, and replanting lower growing trees and bushes in some areas.

### **Visual Quality Objectives**

The proposed transmission line would cross NFS lands in the area identified above as the Entiat Upland Area. The VQO for the lands that would be crossed is Modification. The adjacent existing transmission line corridor is assigned the Maximum Modification VQO. The VQOs are summarized in Table 3.7-1.

This allocation is consistent with the VQO management requirements established for EW-1 and UC-1 and would not be altered by Alternative 1.

Alternative 1 would widen the existing transmission corridor across NFS lands. The proposed H-frame structures would for the most part be lower than the existing BPA lattice towers and would blend in more readily with the surrounding landscape and are, as a result, not expected to substantially increase the overall visibility of the existing corridor or increase the distances from which the corridor can be seen or the number of viewers that would be able to see the corridor. Further, mitigation measures would be employed to reduce overall visual impacts, as described in the preceding section and itemized in Section 2.5.8.

### **3.7.2.3 Alternative 2 – No Action**

Alternative 2 – No Action would not involve any new construction and would therefore have no direct or indirect effects on visual resources and the conditions described in the affected environment discussion would continue unaffected.

### **3.7.2.4 Cumulative Effects**

This section considers the incremental effects of the proposed alternatives when added to other past, present, and reasonably foreseeable future actions. Past and present actions affecting visual resources are described in the affected environment portion of this section and are given consideration in each VAP analysis, which addresses the incremental impact of the Proposed Action in relation to the existing visual environment. This includes the operation and ongoing maintenance of the existing BPA transmission lines and, as a result, the direct and indirect effects analysis assesses the potential visual impacts of the Proposed Action in conjunction with these existing lines. Reasonably foreseeable future actions are defined for the purposes of this analysis as future actions that are planned within or in the immediate vicinity of the project area (defined for this analysis as the area within one mile of the Proposed Action). Projects are considered reasonably foreseeable in time if a plan or permit application has been filed with the county (for private lands) or they are identified as proposed or in progress by the responsible land management agency (for public lands).

The reasonably foreseeable actions included in this analysis are discussed in Section 3.1. These actions include the Crum Canyon Interface Fire Hazard Reduction project, the ongoing Shadow Ridge housing development located south of the proposed switchyard site, and planning permit applications for modifications to or construction of single-family residences within one mile of the Proposed Action.

The Crum Canyon fuels reduction project would affect vegetation by reducing the extent and condition of forested vegetation and changing the age class structure of forests. The Crum Canyon fuels reduction project is designed to create a more opened stand in the areas that would be treated and limited vegetation clearing associated with Alternative 1 would also have this effect. However, the forested portions of the project area are comprised of widely spaced conifer trees with limited natural canopy closure and creating openings in selected areas considered together with the Proposed Action is not expected to result in negative cumulative effects on visual resources.

The ongoing Shadow Ridge development presently includes approximately 10 single family residences and five lots located on the south side of the development that have not yet been sold. The undeveloped lots are located more than 500 feet from the proposed switchyard site and separated from the site by intervening vegetation and an earthen berm, as well as the existing houses in the north part of the development. Development in this area is unlikely to combine with the Proposed Action to result in cumulative impacts to visual resources.

## 3.8 CULTURAL RESOURCES

### 3.8.1 Affected Environment

The project area for the purposes of the literature review component of the cultural resources analysis prepared for this project included the area within one mile of the proposed transmission line route, as well as the broader regional context. The area of potential effect (APE) was limited to the proposed right-of-way, temporary access trails, and switchyard and substation sites associated with Alternative 1 – Proposed Action.

#### 3.8.1.1 Cultural Resources Defined

Cultural resources are districts, sites, buildings, structures, and objects that are evidence of past human activities or that play an active part in the traditional cultures of the disparate ethnic groups that comprise Washington's population. Sites that play an active part in ongoing cultures are known as Traditional Cultural Properties (TCPs). Cultural resources have been recognized by legislative bodies at the Federal and state levels as being important for the education and inspiration of future generations of Americans, whatever their backgrounds.

#### 3.8.1.2 Regulatory Requirements

The importance of protecting cultural resources on lands owned by the Federal government, under Federal jurisdiction, or under the jurisdiction of Washington State has been codified in law and policy. Pertinent statutes are Revised Code of Washington (RCW) 27-44 and 27-53, the National Historic Preservation Act (NHPA), the American Indian Religious Freedom Act, and Executive Order 13007.

- **RCW 27-44.** Otherwise known as the Indian Graves and Records Act, this statute makes it a crime to knowingly disturb, remove, or damage American Indian graves and glyptic records, such as petroglyphs or pictographs.
- **RCW 27-53.** This statute prohibits any individual, corporation, or agency from knowingly removing, altering or disturbing any archaeological site or object, except for an Indian grave or glyptic record, without a written permit from the Director of Community, Trade, and Economic Development, or designee.
- **NHPA.** Under Section 106 of the NHPA, Federal agencies are required to take into account the effects of their undertakings on cultural resources that are, or may be, eligible for inclusion on the National Register of Historic Places (NRHP), and to give the State Historic Preservation Officer and Advisory Council on Historic Preservation a reasonable opportunity to comment. Federal undertakings include actions taken on Federal land or under Federal funding, license, or permit. For the purposes of compliance with Section 106 of the NHPA, the Wenatchee National Forest is the lead agency for this project.
- **American Indian Religious Freedom Act.** This act is similar to the NHPA, requiring agencies to take into account the effect of their actions on the ability of American Indians to practice their traditional religions. An agency is to make efforts to avoid adversely affecting tribal use and access to spiritual places.
- **Executive Order 13007.** Executive Order 13007 directs Federal agencies to consult with tribes to identify sacred sites on public lands, to accommodate access to and ceremonial use of American Indian sacred sites, and to avoid adversely affecting the physical integrity of such sites. This act applies only to Federal lands.

Executive Order 11593 requires agency heads to locate, inventory, and nominate all eligible cultural resources to the NRHP and exercise caution until these inventories and evaluations are complete to ensure that no eligible Federally owned property is transferred, sold, demolished, or substantially altered. The

order outlines procedures for meeting the inventory requirements of NHPA and NEPA and established the principle of “interim protection” which states that, until a resource has been evaluated, it must be treated as if it were eligible for the NRHP.

The Native American Graves Protection Act (Public Law 101-601, implementing regulations at 43 Code of Federal Regulations [CFR] 10) addresses the rights of lineal descendants and members of American Indian tribes, Alaska Native, and Native Hawaiian organizations to retain certain human remains and precisely defined cultural items. It covers items currently in Federal repositories as well as future discoveries on Federal or American Indian lands. Federal agencies must consult with the most likely direct descendant or a culturally affiliated tribe or organization where an undertaking may affect an Indian grave site.

### **3.8.1.3 Cultural Resources in the Project Area**

The following review of cultural resources within the project area was prepared for this project by Cultural Resources Consultants, Inc. (CRC 2007). Archaeological and ethnographic context for this project is provided by numerous sources (Schalk and Mierendorf 1983). The project area is within the traditional territory of the Entiat Indians, recognized as a constituent tribe of, and today represented by the Confederated Tribes of the Colville Reservation. The project area also lies within the boundary of ceded lands of the Yakama Nation. A historic Entiat Indian village location is about three miles south of the project area, along the river (Hart 2004). The first white settlers arrived in the Entiat Valley in May 1887. The first lumber mill was built in 1892 and the first commercial orchard began operation a year later (Sage 1997). By 1894, a second lumber mill had been built along the north bank of the Entiat River; it was around this mill that the town grew, and that year the settler population was reported to be 80 persons (Joint Planning Office 1958). The literature and records search conducted for this project did not identify any specific TCPs within or in the immediate vicinity of the APE (CRC 2007).

No historic structures or archaeological sites are recorded within the proposed project boundary. Recorded archaeological sites within several miles of the project location are generally located along the Columbia River (Hartmann and Schumacher 2003). The nearest recorded sites include FS1564, a petroglyph located about one mile north of the APE; FS1565, historic mining pits about 0.5 mile north of the APE; and 45CH300, the remains of a historic structure located about 0.3-mile west of the APE, in the Entiat River valley. No previous cultural resource surveys have been documented within or in the vicinity of the APE.

Based on existing archaeological data for this area, the types of pre-contact cultural materials that might be present in the APE include the remains of habitation or burial sites, lithic scatters, cairns, trails, or similar features, which could represent a range of domestic, subsistence, and ceremonial activities. Historic-period archaeological deposits would likely be related to domestic and/or timber, small-scale mining, or agricultural activities.

## **3.8.2 Environmental Effects**

This section assesses the potential effects of the proposed alternatives on the social and economic environment. The following discussion is divided into four sections. The first section discusses the evaluation criteria used to assess the potential effects of the alternatives. The following sections describe the potential effects of Alternative 1 – Proposed Action and Alternative 2 – No Action on cultural resources. The cumulative effects of the proposed alternatives are evaluated in Section 3.8.2.4. Direct, indirect, and cumulative effects are defined in Section 3.1 of this document.

### **3.8.2.1 Evaluation Criteria**

The cultural resources that are taken into consideration in this analysis are those that are either listed on the NRHP or considered eligible for such listing under the criteria established in 36 CFR 60.4. Cultural

resources that are eligible for or listed as the National Register are referred to as “historic properties.” To have a significant effect on historic properties, an undertaking must adversely affect one or more of the characteristics of a property that render it eligible, which include its physical integrity; its integrity of setting, feeling, or association; or its ability to yield information important to prehistory or history. If an undertaking does not change any of these characteristics from their current condition, it does not have a significant effect for purposes of this analysis. Three categories of cultural resources were considered in this evaluation: archaeological sites; historic structures, buildings, or objects (historic sites); and TCPs.

### **3.8.2.2 Alternative 1 – Proposed Action**

#### **Fieldwork**

A cultural resources survey was conducted of the project APE in 2007 (CRC 2007). The methods employed during this survey were consistent with those used by professional archaeologists in the region. The survey included observations of surface exposures and the many subsurface profiles provided by erosional faces and/or road cuts. Pedestrian survey transects were walked along the proposed transmission line corridor and at the proposed switchyard and substation sites, and archaeologists also inspected the proposed temporary access trails (CRC 2007).

The survey did not identify any evidence of human activity within the APE, with the exception of the existing transmission lines and associated access roads, the homes located in Crum Canyon, and evidence of more recent recreation activities, and did not identify any potentially significant archaeological materials (CRC 2007).

#### **Effects on Cultural Resources**

The results of the literature review, records search, and field survey conducted for this project, which did not identify any potentially significant cultural resources within or in the immediate vicinity of the project APE (CRC 2007). Therefore, no significant effects to cultural resources are expected under Alternative 1.

### **Consistency with the Wenatchee National Forest Land and Resource Management Plan**

The cultural resources evaluation prepared for this project was developed in accordance with the Forest-wide Standards and Guidelines that apply to EW-1 (Key Deer and Elk Habitat) and UC-1 (Utility Corridors) designations and require that cultural resource inventories be conducted according to strategies and consultation procedures established on the Forest (USDA Forest Service 1990; IV-66, IV-99, 100).

### **3.8.2.3 Alternative 2 – No Action**

Alternative 2 – No Action would not involve any new construction and would, therefore, have no effect on cultural resources.

### **3.8.2.4 Cumulative Effects**

This section considers the incremental effects of the proposed alternatives when added to other past, present, and reasonably foreseeable future actions. Past and present actions affecting resources are included in the affected environment portion of this section. Past actions and events that may have affected cultural resources include fire and floods, agricultural development, timber harvest, road construction, residential and commercial construction, and construction of the existing BPA power lines. Reasonably foreseeable future actions are defined for the purposes of this analysis as future actions that are planned within or in the immediate vicinity of the project area (defined for this analysis as the area within one mile of the Proposed Action). Projects are considered reasonably foreseeable in time if a plan or permit application has been filed with the county (for private lands) or they are identified as proposed or in progress by the responsible land management agency (for public lands).

The reasonably foreseeable actions included in this analysis are discussed in Section 3.1. These actions include the Crum Canyon Interface Fire Hazard Reduction project, the ongoing Shadow Ridge housing development located south of the proposed switchyard site, and planning permit applications for modifications to or construction of single-family residences within one mile of the Proposed Action. There were no potentially significant cultural resources identified within or in the immediate vicinity of the project APE (CRC 2007) and, therefore, the Proposed Action is not expected to contribute to cumulative effects associated with these past, present, and reasonably foreseeable actions.

## **3.9 SOCIAL AND ECONOMIC ENVIRONMENT**

### **3.9.1 Affected Environment**

The project area is located in Chelan County, Washington (Figure 1-1). Chelan County, located in the north central part of the state, encompasses approximately 2,921 square miles and is bordered by seven other Washington counties. Approximately 70 percent of Chelan County is located within the Wenatchee National Forest (McGinnis et al. 1997). The project area and immediate vicinity includes the Entiat Valley and the City of Entiat. The City of Entiat is located on the west bank of the Columbia River approximately 18 miles north of the City of Wenatchee, the county seat, and 10 miles north of Rocky Reach Dam.

Comments made during public scoping for this project identified the following issues with respect to the social and economic environment:

- Potential rate increases required to pay for the project could negatively affect the City of Entiat and valley residents.
- Potential impacts to mule deer could affect mule deer hunting, which is a highly valued, traditional activity within the project area and an important source of tourist revenue to local communities.
- Traffic associated with construction and operation of the proposed switchyard could generate traffic impacts on State Highway 97 Alternate (Highway 97A).

The following sections present a general overview of the social and economic conditions in the study area and provide a baseline against which the potential effects of the alternatives may be measured. The discussion is organized into three main sections that address demographic characteristics and trends, economic conditions, and public services and transportation.

#### **3.9.1.1 Demographic Characteristics and Trends**

Chelan County had an estimated population of 71,200 in 2006. Entiat, located near the west side of the project area, had an estimated 2006 population of 1,130 (Table 3.9-1). Chelan County is the third largest county (in geographic area) in Washington State with an average population density of 22.8 persons per square mile compared to a state average of 88.6 persons per square mile (U.S. Census Bureau 2007a).

Data are also provided in Table 3.9-1 for the Entiat Census County Division (CCD) and Census Tract 9601. A CCD is a subdivision of a county that is a relatively permanent statistical area established cooperatively by the Census Bureau and state and local government authorities. The Entiat CCD, which encompasses much of the Entiat Valley, as well as the City of Entiat, had a population of 2,130 in 2000, the only year population data are available for this area.

Census tracts are also relatively permanent statistical areas that typically average about 4,000 residents and are designed to be relatively homogenous units with respect to population characteristics, economic status, and living conditions at the time of establishment. Census tract 9601 includes the Entiat CCD and extends northeast to the county line. This area had a population of 2,236 in 2000, an increase 605 people or 37 percent from 1990, with much of this increase occurring in the City of Entiat (Table 3.9-1).

**Table 3.9-1. Population 1990, 2000, and 2006**

	1990	2000	2006	1990 to 2000		2000 to 2006	
				Absolute Change	Percent Change	Absolute Change	Percent Change
Chelan County	52,250	66,616	71,200	14,366	27%	4,584	7%
Entiat CCD	na	2,130	na	na	na	na	na
Census Tract 9601	1,631	2,236	na	605	37%	na	na
Entiat city	449	957	1,130	508	113%	173	18%
<b>Washington</b>	<b>4,866,692</b>	<b>5,894,121</b>	<b>6,488,000</b>	<b>1,027,429</b>	<b>21%</b>	<b>593,879</b>	<b>10%</b>
Notes: CCD – Census County Division na – not available Sources: U.S. Census Bureau 1990, 2000a; Washington OFM 2002a, 2007a							

Total county population increased by 14,366 people or 27 percent between 1990 and 2000, an increase above the state average of 21 percent. Population growth results from either net in-migration or natural increase. Net in-migration occurs when more people move to an area than leave. Natural increase occurs when there are more births than deaths. Migration accounted for 55 percent of statewide population growth between 2000 and 2005, with natural increase accounting for the remaining 45 percent. Natural increase played a larger role in Chelan County accounting for approximately 57 percent of population growth over this period (U.S. Census Bureau 2007b).

Three series of population projections (low, intermediate, high) were developed for Washington state in 2002 (Washington OFM 2002b). The low series projected that the population of Chelan County would grow at a comparable rate to the state as a whole, with the population in Chelan County projected to increase by 15 percent between 2000 and 2020, compared to 14 percent statewide (Washington OFM 2002b). A comparison of these projected increases with actual growth from 2000 to 2005 indicated that growth rates in both Chelan County and Washington exceeded the low series projections. Statewide growth rates also exceeded the intermediate projections, while the population in Chelan County grew at a slightly slower rate than projected under the intermediate series (Washington OFM 2007b).

### Race and Ethnicity

The population of Washington was 79 percent White in 2000, with persons of Hispanic or Latino origin accounting for 7 percent. The population that identified as White in the 2000 census in Chelan County and the Entiat area comprised a similar share of the total population in these areas (ranging from 74 percent to 79 percent), with persons of Hispanic or Latino origin accounting for a larger percentage of the local population (ranging from 18 percent to 23 percent) than they do statewide (Table 3.9-2).

Recent estimates developed by the Washington State Office of Financial Management (OFM) suggest that the share of the population in Chelan County comprising persons of Hispanic or Latino origin increased from 19 percent in 2000 to 24 percent in 2006 (Washington OFM 2007c).

**Table 3.9-2. Race and Ethnicity, 2000**

	<b>Total</b>	<b>White<sup>1/</sup></b>	<b>Hispanic or Latino</b>	<b>American Indian and Alaska Native<sup>1/</sup></b>	<b>Two or more races<sup>1/</sup></b>	<b>Other Race<sup>1,2/</sup></b>
Chelan County	66,616	77%	19%	1%	1%	1%
Entiat CCD	2,130	78%	19%	1%	1%	1%
Census Tract 9601	2,236	79%	18%	1%	1%	1%
Entiat city	957	74%	23%	1%	1%	1%
<b>Washington</b>	<b>5,894,121</b>	<b>79%</b>	<b>7%</b>	<b>1%</b>	<b>3%</b>	<b>9%</b>

Notes:

1/Non-Hispanic only. The Federal government considers race and Hispanic/Latino origin to be two separate and distinct concepts. People identifying Hispanic or Latino origin may be of any race. The data summarized in this table present Hispanic/Latino as a separate category.

2/The "Other" category presented here includes census respondents identifying as Black or African American, Asian, Native Hawaiian and Other Pacific Islander, or Some Other Race.

Source: U.S. Census Bureau 2000b

## Housing

There were a total of 30,407 housing units identified in Chelan County in 2000, with an overall vacancy rate of approximately 18 percent, compared to a statewide average of 8 percent (U.S. Census Bureau 2000c). Chelan County had an estimated rental vacancy rate of approximately 8 percent (691 units) in 2000 (Table 4.9-3). Rental vacancy rates in the City of Entiat and the Entiat CCD were 6 percent and 5 percent, respectively (Table 3.9-3).

**Table 3.9-3. Housing, 2000**

	<b>Chelan County</b>	<b>Entiat CCD</b>	<b>Census Tract 9601</b>	<b>Entiat city</b>
<b>Total Housing Units</b>	30,407	1,032	1,198	400
Occupied	25,021	784	823	342
Vacant or vacant part-year:	5,386	248	375	58
Seasonal use	2,815	151	277	31
Rented/sold, unoccupied	157	2	2	1
For rent	691	13	13	7
For sale, other	481	21	21	11
<b>Total Rental Housing<sup>1/</sup></b>	8,843	267	289	110
<b>Rental Vacancy rate<sup>2/</sup></b>	8%	5%	4%	6%

Notes:

1/This total includes both occupied and vacant rental housing.

2/This rate is based on the number of vacant units available "For rent" divided by the total number of rental units.

CCD – Census County Division

Source: U.S. Census Bureau 2000c

### 3.9.1.2 Economic Conditions

Economic conditions in Chelan County are strongly influenced by the agricultural sector, which accounted for 10 percent of total employment in 2005, almost five times the state average (Table 3.9-4). Employment in the agricultural sector tends to be seasonal and relatively low paid. The relative concentration of employment in other sectors is either roughly equal to or lower than the state average (Table 3.9-4). Chelan County and the other north central Washington counties (Douglas, Kittitas, and Okanogan) are the main producers of apples, cherries, and pears in Washington, with deciduous trees accounting for 64 percent of all agricultural employment in Chelan County in 2000 (Washington State

Employment Security 2002). Apples, cherries, pears, and other soft fruits are cultivated by farmers in the Entiat Valley.

Recreation and tourism is another important component of the economy of Chelan County. Employment in the recreation and tourism sector generally also tends to be seasonal and relatively low paid, with a high proportion of the labor force self-employed. Recreation and tourism is not classified or measured as a standard industrial category and employment and income data are not specifically collected for this sector. Components of recreation and tourism activities are instead captured in other industrial sectors, primarily the retail sales and services sectors. Estimates of travel impacts developed for the Washington State Office of Trade and Economic Development and Washington State Tourism indicated that travel-related expenditures accounted for an estimated 9.7 percent of total employment in Chelan County in 2005, compared to 3.9 percent statewide (Dean Runyan Associates 2006).

The City of Entiat identifies itself as the “Gateway to Recreation” and offers various recreational activities within the city boundaries. Mad River recreation area located about 5 miles northwest of the project area and the town of Ardenvoir are accessed via Entiat River Road. This area offers opportunities for hunting, hiking, mountain biking, and horseback riding, as well as cross-country skiing and snowmobiling in the winter.

The City of Wenatchee, largest city in Chelan County, accounted for 40 percent of total population in the county in 2006, and serves as a major regional center. Wenatchee is located approximately 18 miles south of the project area. The City of Chelan, another regional center, is located approximately 18 miles north.

**Table 3.9-4. Employment by Sector, 2005**

Type of Employment	Employment		Percent of Total		Location Quotient <sup>2/</sup>
	Chelan County	Washington	Chelan County	Washington	
Total employment <sup>1/</sup>	52,351	3,733,429	100	100	1.0
Farm employment	5,003	75,697	10	2	4.7
Nonfarm employment	47,348	3,657,732	90	98	0.9
Mining, forestry, fishing and other	(D)	57,489	(D)	2	(D)
Utilities	52	5,243	0	0	0.7
Construction	2,954	239,177	6	6	0.9
Manufacturing	2,315	288,975	4	8	0.6
Wholesale trade	1,666	137,504	3	4	0.9
Retail trade	6,144	403,156	12	11	1.1
Transportation and warehousing	1,089	105,744	2	3	0.7
Real estate	1,835	156,514	4	4	0.8
Consumer Services	7,213	524,910	14	14	1.0
Producer Services	5,109	727,029	10	19	0.5
Social Services	6,104	413,449	12	11	1.1
Government	6,653	598,542	13	16	0.8
Notes:					
(D) – Not shown to avoid disclosure of confidential information. Estimates for these items are included in the totals.					
1/Full- and part-time employment includes self-employed individuals. Employment data are by place of work, not place of residence, and, therefore, include people who work in the area but do not live there. Employment is measured as the average annual number of jobs, both full- and part-time, with each job that a person holds counted at full weight.					
2/The location quotient is a relative measure of industry specialization that compares the percentage of employment concentrated in each sector in the study region with a benchmark region, in this case the State of Washington. A location quotient of 1.0 indicates that the study region has the same percentage of employment in this sector as the benchmark region does. Location quotients above or below 1.0 indicate that the study region is over- or under-represented in this sector, respectively.					
Source: U.S. Bureau of Economic Analysis 2007a					

Per capita income, which is calculated by dividing total personal income by population, was lower than the statewide average in Chelan County in 1999, \$19,273 versus \$22,973 (Table 3.9-5). Per capita income was also below the state average in the City of Entiat and the Entiat CCD, comprising 59 percent and 71 percent of the state average, respectively.

Per capita income and total personal income were \$29,657 and \$2.074 billion in Chelan County in 2005, respectively (U.S. Bureau of Economic Analysis 2007b).

The percent of the population below the poverty rate in 1999 was higher than the state average in Chelan County, Entiat, and the Entiat CCD, ranging from 12.4 percent in Chelan County to 14.2 percent in the Entiat CCD (Table 3.9-5).

**Table 3.9-5. Per Capita Income and Persons Below the Poverty Level, 1999**

County/Census Tract/State	Per Capita Income		Persons Below Poverty	
	1999 (\$)	Percent of State Average	Percent of Individuals Below Poverty Level	Difference from State Average (Percent)
Chelan County	19,273	84	12.4	1.8
Entiat CCD	16,282	71	14.2	3.6
Entiat city	13,529	59	14.0	3.3
Washington	22,973	100	10.6	0.0
Source: U.S. Census Bureau 2000d				

### 3.9.1.3 Public Services and Transportation

The project area is mainly located on unincorporated public lands. The parcels of private property located in the vicinity of either end of the proposed transmission line are also located in unincorporated Chelan County. The Chelan County Sheriff's Office provides law enforcement services for the unincorporated areas in the vicinity of the project, and also provides these services to the City of Entiat under contract (Chelan County 2005). A branch office of the Chelan County Sheriff's Office is located in the Entiat City Hall. Hospital and medical facilities near the project area include the Lake Chelan Community Hospital in the City of Chelan and the Central Washington Hospital and Wenatchee Valley Hospital, both located in Wenatchee (City-Data.com 2007). Chelan Washington Hospital is the area's trauma center.

The primary transportation routes within the vicinity of the project area are Highway 97A, which borders the proposed switchyard site at the east end of the proposed transmission line and Entiat River Road, which borders the proposed substation site on the west end. Crum Canyon Road also runs through the west portion of the project area. This road is initially a narrow paved road providing access to private residences and property located either side and then continues unpaved and provides access to the existing Bonneville Power Administration (BPA) access roads that the Public Utility District No. 1 of Chelan County (District) would use to access the new structures under the Proposed Action.

## 3.9.2 Environmental Effects

This section assesses the potential effects of the proposed alternatives on the social and economic environment. The following discussion is divided into four sections. The first section discusses the evaluation criteria used to assess the potential effects of the alternatives. The following sections assess the potential social and economic effects of Alternative 1 – Proposed Action and Alternative 2 – No Action. The cumulative effects of the proposed alternatives are evaluated in Section 3.9.2.4. Direct, indirect, and cumulative effects are defined in Section 3.1 of this document. The fifth and final section addresses environmental justice issues.

### 3.9.2.1 Evaluation Criteria

Issues raised during public scoping with respect to the social and economic environment are identified in Section 3.9.1. The following sections address these issues and consider the following evaluation criteria:

- Increases in jobs and local spending associated with construction and operation of the new transmission line and associated facilities
- Potential changes in electricity rates
- Potential changes in hunting-related tourism revenues
- Potential changes in demand for housing and public services
- Transportation-related impacts
- Potential changes in property values

Projected increases in jobs, estimated construction costs, and local spending and potential rate increases can be quantified. The other items are evaluated in qualitative terms. The following sections discuss these criteria and identify those impacts that are expected to be significant.

### 3.9.2.2 Alternative 1 – Proposed Action

#### Economic Conditions

##### *Construction*

Alternative 1 would have a small but positive impact on the regional economy during construction through the local procurement of materials and equipment and spending by construction workers. Total project costs are estimated to be approximately \$10 million to \$13 million. Local purchases would be about \$1 million of this total and include indirect labor expenses, transportation, some equipment rentals, and other incidental materials and supplies.

The District would hire a specialist design consultant to fully design the proposed transmission line, switchyard, and substation, and subsequently, other specialty contractors to construct the three project components. District employees would be responsible for land acquisition, surveys, environmental monitoring, and providing the contractor with construction materials. Direct labor costs are expected to account for approximately \$1.1 million of total estimated construction costs. Construction of the transmission line would occur over one season (April through October) and is expected to involve approximately 18,000 labor hours or 9 full-time equivalent years or “job-years.” A job-year is equal to 12 months of employment and may involve more than one worker, which would be the case here. Construction of the proposed substation would take place the following year and involve approximately 5,000 labor hours or 2.5 job-years. The switchyard would be constructed in 2011 and require about 3,900 labor hours or 2 job-years. The overall schedule would be dependent on the District’s budget and budgetary approval.

Different job skills would be required during construction of the proposed facility, but few would be required for the entire duration of the project. Viewed over time, construction employment would involve a series of new jobs starting and old jobs ending each month.

The labor force would vary from month-to-month and range from a peak of 25 workers in months 4 and 5 to a low of about 6 workers in the final half month. As much as 50 percent of the construction labor force would be hired locally (within daily commuting distance), with the remainder temporarily relocating or commuting on a weekly basis from Spokane or Seattle.

Estimated local project-related expenditures, employment, and construction-related earnings are short-term and would be small relative to the total amount of economic activity, employment, and income in

Chelan County, and even smaller when viewed as a component of the regional economy. As a result, the overall effect of construction-related activities on the local and regional economies, while positive, is expected to be low.

Operation of the proposed transmission line is not expected to increase economic activity in the local or regional economy, but would resolve existing capacity issues and improve the reliability of the current supply, as well as provide additional capacity that would be available to support future economic and other development should it occur in the future. This overall effect is expected to be positive but low.

### ***Electric Rates***

Concern was expressed during scoping that potential rate increases required to pay for the project could negatively affect the City of Entiat and valley residents. Currently, the costs of providing District services are not fully covered by existing rates, and financial pressures continue to grow—including the need for the Entiat 115kV Transmission program. This program will not be the primary reason for seeking future rate increases, but it does contribute to the overall need for more revenue. However, the District's electric rate structure is based on rate class and type of service, not residential location. Accordingly, City of Entiat and valley residents would continue to pay the same residential rates as others receiving the same type of service in Chelan County (including any future rate increases that may be approved by the District's Board of Commissioners).

### ***Recreation and Tourism***

Another issue identified during project scoping was the concern that the proposed action could have negative effects on mule deer and, as a result, have detrimental effects on mule deer hunting, which was identified as a highly valued, traditional activity within the project area, and an important source of tourist revenue to local communities. The potential effects of Alternative 1 on mule deer are assessed in Section 3.5, Wildlife. This assessment found that Alternative 1 is not expected to have a significant effect on mule deer populations in the area. As a result, Alternative 1 is not expected to have long-term effects on hunting-related recreation and tourism or associated revenues. Access to the proposed transmission line would be from existing BPA access roads, with approximately 18 short, temporary trails extended from the ends of the existing roads to the new structures. These roads would be permanently closed, recontoured and revegetated, following completion of construction and are, therefore, not expected to affect existing access patterns or land uses.

Construction of Alternative 1 could, however, have short-term negative effects on hunters seeking deer in the immediate vicinity of construction activities. Mule deer hunting seasons in Game Management Unit (GMU) 247-Entiat in 2007 extended from September 1 to September 30 for archery and October 13 to October 21 for firearms (WDFW 2007d). Anecdotal information suggests that the deer and hunters in GMU 247 tend to congregate north of the Entiat River, east from Potato Creek (which is west of the project area) to Crum Canyon (HuntWashingtonstate.com 2007). Project construction would likely still be ongoing at these times, but potential impacts would be localized and temporary. While some hunters might be temporarily displaced, the number is expected to be relatively small and displaced hunters would likely be displaced to other nearby locations still within GMU 247. As a result, construction of the proposed transmission line under Alternative 1 is not expected to affect short-term hunting-related tourism revenue in the area.

### ***Housing***

During peak construction, approximately 20 to 25 workers would work along various segments of the six mile corridor, with different crews operating in different locations. Assuming about 50 percent of this labor force would temporarily relocate to the area would result in 10 to 13 workers seeking temporary accommodation in the area at the peak of the construction activities. These workers would likely reside in the vicinity of the project area and occupy trailer courts, rent apartments or houses, or stay in motels for

short stays. It is unlikely that any of these temporary workers would permanently settle in the project area. Sufficient numbers of rental properties, lodging facilities, and campgrounds are available within commuting distance to house these non-local construction workers.

### **Public Services and Transportation**

Construction of the proposed project under Alternative 1 is not expected to cause significant demands on public services or facilities. During construction, public services such as police, fire, and medical facilities, would only be needed in cases of emergency (i.e., construction accidents). Standard safety procedures would be followed at all times during construction and the potential for accidents is expected to be low. Emergency services are provided for the unincorporated project area by Chelan County. The nearest emergency medical facility to the project area is located in Wenatchee.

As noted above, approximately 50 percent of the projected labor force is expected to temporarily relocate to the project area. Given the short duration of the proposed project, especially when viewed in terms of individual jobs, many of which would last two months or less, it is unlikely that the project would cause many, if any construction workers, to temporarily relocate their families to the area and, as a result, the project is not expected to have any effect on local school enrollment.

Concern was expressed during scoping that the proposed switchyard located adjacent to Highway 97A may generate traffic impacts. Construction activities would not involve vehicles or crews working from Highway 97A and the District does not anticipate that any road closures would be necessary during switchyard construction. An unpaved access road from Highway 97A currently exists on the proposed switchyard site. The District would improve this road, which would provide construction and operation and maintenance access to the proposed switchyard. Once improved, this turnoff would be sufficient to accommodate switchyard-related traffic without interfering with existing flows along Highway 97A, which ranged from 3,700 to 4,200 vehicles a day along this stretch of the highway in 2006 (Washington Department of Transportation 2007). Following construction, traffic visiting the completed switchyard would be limited to routine security inspections which would, on average, be conducted twice a week, with occasional operation and maintenance inspections. This traffic would also have limited impacts on existing traffic flows on Highway 97A.

### **General Property Impacts, Compensation and Property Values**

The District proposes to construct a new single-circuit 115 kV electric transmission line adjacent to the existing BPA transmission corridor that presently includes 345 kV and 500 kV transmission lines. Although the transmission line would parallel this existing corridor, the District would need to acquire new right-of-way (ROW) easements from four private property owners (for five parcels), as well as a Special Use Permit from the USDA Forest Service, a ROW grant from the Bureau of Land Management (BLM), and easements from the Washington Department of Natural Resources, and Washington Department of Fish and Wildlife. Private easements would be required for approximately 0.9 mile of new transmission line at the west end of the project area.

#### ***General Property Impacts and Compensation***

The affected private landowners would be offered market value, as established through the appraisal process, for the required transmission line easements. The easements required may encumber the ROW area with land use limitations. Each easement would include provisions to keep the ROW clear of trees, structures, and other potential fire and electrical hazards. The impact of introducing a new transmission line ROW can vary depending on the placement of the ROW in relation to the property's size, shape, and the location of existing improvements. A transmission line may diminish the utility of a portion of property if the line effectively severs this area from the remaining property (called "severance damage"). Whether a transmission line introduces a negative visual impact depends on the placement of the line across a property as well as each individual landowner's perception of what is visually acceptable or

unacceptable. These factors as well as any other elements unique to the property are taken into consideration to determine the loss in value within the easement area, as well as outside the easement area in cases of severance.

### ***Property Values***

Although not raised during public scoping for this project, one concern often raised with respect to transmission line construction is the potential for negative impacts on property values. Empirical studies investigating the impact of transmission lines on property values have resulted in a wide range of findings that reflect the different study approaches employed, as well as the unique characteristics of the particular case or cases being evaluated. In general, studies of impacts during periods of physical change, such as new transmission line construction, have generally identified greater impacts in the short-term, with effects tending to decrease over time. Property value impacts associated with transmission lines have also been found to generally decrease with distance.

While past studies are informative, the wide range of findings illustrates the difficulties involved in generalizing the findings of case studies to other locations and situations. There are a number of unique project characteristics that need to be taken into consideration when assessing the potential effects of transmission line structures on property values. These include the type and height of the structures, the distance and view from the potentially affected property, intervening topography and vegetation, and the property market and type of landscape involved. According to Cowger et al. (1996), most studies that evaluate the effects of electric transmission lines on residential property values conclude that other factors such as the location and size of the property, type and condition of improvements, and the level of real estate activity are more important in determining the value of residential property than the presence or absence of a transmission line.

Some short-term adverse impacts on property values (and salability) might occur on an individual basis as a result of the proposed action alternative. These impacts would vary by property and are difficult to predict. Alternative 1 is not expected to cause long-term adverse effects to property values along the ROW or in the general vicinity because the proposed transmission line crosses a relatively short distance of private land and is visible from a limited number of locations. In addition, the proposed transmission line would be located adjacent to an existing transmission corridor that includes much larger structures that have been present since the 1940s. These non-project impacts, along with other general market factors, are already reflected in the market value of private properties in the area and these conditions are not expected to change appreciably with the addition of another smaller transmission line.

#### **3.9.2.3 Alternative 2 – No Action**

Potential beneficial (e.g., income and employment) and adverse socioeconomic impacts (housing and short-term property value) associated with construction and operation of the proposed action alternatives would not occur under the No Action Alternative. No action could, however, result in other adverse socioeconomic impacts, primarily those associated with reduced reliability and increased maintenance access requirements. Reduced reliability could lead to higher energy costs, and power outages due to existing capacity deficiencies would have adverse effects on local residents, as well as local businesses and employees. No action could also limit potential future business and residential development in the area.

#### **3.9.2.4 Cumulative Effects**

This section considers the incremental effects of the proposed alternatives when added to other past, present, and reasonably foreseeable future actions. Past and present actions affecting resources are included in the affected environment portion of this section. Reasonably foreseeable future actions are defined for the purposes of this analysis as future actions that are planned within or in the immediate vicinity of the project area (defined for this analysis as the area within one mile of the Proposed Action).

Projects are considered reasonably foreseeable in time if a plan or permit application has been filed with the county (for private lands) or they are identified as proposed or in progress by the responsible land management agency (for public lands).

The reasonably foreseeable actions included in this analysis are discussed in Section 3.1. These actions include the Crum Canyon Interface Fire Hazard Reduction project, the ongoing Shadow Ridge housing development located south of the proposed switchyard site, and planning permit applications for modifications to or construction of single-family residences within one mile of the Proposed Action.

The Crum Canyon Interface Fire Hazard Reduction project would meet all applicable Forest Plan standards and guidelines intended to protect existing natural resources. The limited residential development within 1 mile of the Proposed Action is assumed to meet all local, county, and state planning regulations and ordinances. The population in Chelan County increased at a faster rate than the state as a whole in the 1990s and has continued to grow since 2000, but at a slower rate. Population is projected to continue to grow in Chelan County over the next decade. The identified capacity deficiency that this project is designed to address was identified based on projected electrical demand in the valley. Correcting this deficiency would increase the reliability of the electrical supply in the area but is not expected to substantially alter existing or projected land use patterns.

Considered together with these past, present, and reasonably foreseeable future actions the cumulative effect of the Proposed Action on the social and economic environment is expected to be low.

### **3.9.2.5 Environmental Justice**

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each Federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low income populations. The Order further stipulates that the agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination because of their race, color, or national origin.

#### **Disproportionate High and Adverse Effects**

The proposed action alternative would not result in disproportionately high and adverse effects to minority or low income groups. The population in the Entiat CCD, which includes the entire project area, was 78 percent White in 2000, with 19 percent of the population of Hispanic or Latino origin, and essentially mirrored the racial and ethnic composition of Chelan County as a whole (Table 3.9-2). Per capita income was lower and the percent of the population with income below the poverty level was higher than the Chelan County average (Table 3.9-5). However, given the location of the proposed transmission line, the presence of an existing transmission corridor, and the low number of potentially directly affected residents, the proposed action is not expected to have disproportionate effects on any low income or minority groups.

#### **Public Participation**

The District has considered all input from persons or groups regardless of race, income status, or other social and economic characteristics. In 2005, the District formed the Entiat Valley Electrical Upgrade Focus Group (Focus Group), which consists of local residents and Federal and state agency representatives, to assist in the development and review of potential options to improve electrical service to the Entiat Valley. All local residents were invited to attend community meetings that were held to share information and discuss progress made by the Focus Group. Public scoping was held for the project with the associated public comment period extending from May 18, 2007 to June 18, 2007. A scoping package for the project was mailed on behalf of the USDA Forest Service, BLM, and the District to

approximately 1,000 people, organizations, and government agencies, including all District customers in Entiat and the Entiat Valley, other potentially affected landowners, local public officials, and the USDA Forest Service's existing public involvement mailing lists. Interested parties were encouraged to provide written input via email, U.S. mail, or fax.

Potentially affected minority populations include American Indian tribes with an interest in the federal lands that could be potentially affected. The USDA Forest Service initiated government-to-government consultation with the Yakama Indian Nation and the Confederated Tribes of the Colville Reservation as part of this project prior to the public scoping period and provided a copy of the cultural resources study prepared for this project for their review (CRC 2007). Neither government raised any concerns about the project.

## 3.10 NOISE, PUBLIC HEALTH, AND SAFETY

### 3.10.1 Affected Environment

This section presents an assessment of the impacts of the proposed alternatives on noise, public health, and safety in the project area. Comments made during public scoping for this project identified the following issues with respect to noise, public health, and safety:

- The proposed switchyard may generate noise impacts.
- Building the proposed switchyard in an area subject to rock slides could present a number of problems, as falling rocks and boulders could hit the proposed switchyard and potentially spark a wildfire.

The following sections discuss noise, electric and magnetic fields, and fire.

#### 3.10.1.1 Noise

##### Overview

Sound is typically described using the decibel (dB) scale, a logarithmic rating system that accounts for large differences in audible sound intensities. This scale accounts for the human perception of a doubling of loudness as an increase of 10 A-weighted decibels (dBA). A 70-dBA sound level, for example, sounds twice as loud as a 60-dBA sound level. Noise levels expressed in dBA for various common sources are presented in Table 3.10-1. Factors affecting potential noise impacts include distance from the source, frequency of the sound, absorbcency of the ground, the presence of obstructions, and the duration of the sound.

**Table 3.10-1.** Common Noise Sources and Sound Levels

Noise Source or Effect	Sound Level (dBA) <sup>1/</sup>
Threshold of pain	128
Rock-and-roll band	108
Truck at 50 feet	80
Gas lawnmower at 100 feet	70
Normal conversation indoors	60
Moderate rainfall on foliage	50
Refrigerator	40
Bedroom at night	25
Hearing threshold	0
1/Decibels (A-weighted) Source: BPA 2003a	

Audible noise levels vary in time. Statistical descriptors, known as exceedence levels (L levels), have been developed to account for fluctuating sound levels. L levels refer to the A-weighted sound level that is exceeded for a specified percentage of time. L<sub>50</sub>, for example, refers to the sound level exceeded 50 percent of the time and represents a median level (BPA 2003b).

Transmission line corona, the partial electrical breakdown of the insulating properties of air around the conductors of a transmission line, can produce audible noise. This type of noise is typically characterized as a hissing, crackling sound that, under certain conditions, is accompanied by a hum (BPA 2003b).

Audible noise from transmission lines is most noticeable when conductors are wet, which may occur during periods of rain, fog, snow, or icing. Audible noise levels from transmission lines also vary based

on the voltage of the line. The Bonneville Power Administration (BPA), measuring transmission noise at the edge of existing rights-of-way (ROWs) for 230 kilovolt (kV) lines and a short section of 500 kV line, identified median ( $L_{50}$ ) levels of about 44 dBA and 50 dBA, respectively (BPA 2003b). Measurements were not taken of a 115 kV line, which is the voltage at which the transmission line proposed under Alternative 1 would be operated.

Audible noise produced by an electric substation depends on the equipment used in the substation. The main source of audible noise produced by substation equipment (not the connecting transmission lines) is generally associated with transformers used to step transmission voltages down to distribution levels.

## **Regulation**

The Washington Administrative Code (WAC) identifies maximum permissible environmental noise levels for properties based on their Environmental Designation for Noise Abatement (EDNA) (WAC 173-60-040). Permissible noise levels are based on the EDNA of both the noise source and the receiving property. Transmission lines, which are classified as industrial property (Class C EDNA), may cause a maximum permissible noise level of 60 dBA to intrude into residential property during daytime hours (7 a.m. to 10 p.m.) (BPA 2003a). This level is reduced to 50 dBA during nighttime hours (10 p.m. to 7 a.m.). Noise from electrical substations is exempt from the 10-dBA nighttime reduction (WAC 173-60-050 [2] [a]). Sounds created by installation or repair of essential utility services are exempt from the daytime maximum permissible noise level standards (WAC 173-60-050 [1] [e]).

## **Existing Conditions**

Background levels of existing audible noise in the project area vary based on a number of factors, including existing land uses, weather conditions, and whether there is traffic or other human activity nearby. Land use in the project area is discussed in Section 3.6, Land Use and Recreation. The proposed transmission line would parallel the south side of the existing corridor for the BPA 345 kV and 500 kV transmission lines for the majority of its length.

Traffic is the primary source of human noise generated in parts of the project area where there are existing roads. Light automobile traffic at 100 feet has a typical sound level of 50 dBA. A heavy truck at 50 feet has a typical sound level of 80 dBA. Average sound levels due to line sources such as traffic decrease with distance from the road at a rate of 3 to 4.5 dBA per doubling of distance from the road.

Ambient noise levels along the portions of the proposed transmission corridor located away from roads largely depend on wind and rain and are influenced by the existing transmission lines located in the adjacent BPA corridor. Median levels during foul weather at the edge of existing ROWs are about 44 dBA for 230 kV lines and 50 dBA for a short section of 500 kV line (BPA 2003b). Noise levels associated with rain on foliage may be up to 50 dBA (Table 3.10-1).

### **3.10.1.2 Electric and Magnetic Fields**

Transmission lines, like all electrical devices and equipment, produce electric and magnetic fields (EMF). Current, movement of electrons in a wire, produces the magnetic field. Voltage, the force that drives the current, is the source of the electric field. Transmission line-related EMF strength depends on the design of the line and on the distance from the line. The strength of the field decreases rapidly with distance. EMFs also occur naturally, caused by the weather and the earth's geomagnetic field.

EMFs are found around any electrical wiring, including household wiring and electrical appliances and equipment. Electric field strength is measured in volts or kilovolts per meter (kV/m). The electric-field strength from wiring and appliances located within homes is typically less than 0.01 kV/m. Fields of 0.1 kV/m and higher, however, can be found very close to some appliances, such as electric blankets.

Magnetic fields are measured in units of gauss (G). A typical home has a background magnetic field level (away from electrical appliances and home wiring, etc.) that ranges from 0.5 milligauss (mG) to 4 mG, with an average value of 0.9 mG. Magnetic fields decrease with distance. Fields of tens or hundreds of mGs can be present close to household appliances. Unlike electric fields, magnetic fields from outside power lines are not reduced in strength by trees and building materials, though they are reduced by distance and are insignificant more than 100 feet from the edge of the ROW (EPA 2002).

Possible health concerns associated with electric and magnetic fields have included childhood and adult cancers. The issue of whether long-term health effects are associated with transmission-line fields is controversial and has been the subject of numerous studies. The findings of a number of these studies are summarized and reviewed in the National Institute of Environmental Health Sciences (NIEHS) publication, *EMF: Electric and Magnetic Fields Associated with the Use of Electric Power* (2002). Scientific reviews of this research have found insufficient evidence to conclude that EMF exposures lead to long-term health effects, such as adult cancer, adverse effects on reproduction, pregnancy, growth and development of the embryo, or childhood leukemia (NIEHS 2002).

Magnetic fields within transmission line corridors constantly increase and decrease for a variety of reasons. If electric loads on a line increase, magnetic fields also increase. Magnetic fields are typically greatest in winter months when electrical demands are highest. Operational, meteorological, and line design factors also affect magnetic fields. Fields are higher when the line is physically lower (closer to the ground), either because of design or because of higher temperatures. According to previous studies (BPA 1994, as presented in NIEHS 2002), magnetic fields from a 500 kV line average around 29.4 mG at 60 feet, decreasing to about 12.6 mG and 3.2 mG at 100 feet and 200 feet, respectively. In comparison, a 115 kV line magnetic field averages around 6.5 mG at 50 feet, decreasing to 1.7 and 0.4 mG at 100 feet and 200 feet, respectively.

### **3.10.1.3 Fire**

Fire is part of the natural landscape on the east slope of the Cascades (Everett et al. 2000). Fuels concentrations have increased dramatically in the last 50 years in many forested areas, raising the probability of higher fire intensity and higher rates of tree mortality and soil damage. The climate of the project area is arid and mild with limited rainfall during the summer. Fires in this region tend to be hotter and larger during the dry summer months. Large trees adjacent to the existing transmission line ROWs pose a threat if they blow into transmission lines and catch fire through direct contact, or ignite surrounding vegetation. Finally, vegetation, if allowed to become overgrown, may grow into or fall on transmission lines. This poses an additional risk of fire due to direct contact, and may also cause power outages.

## **3.10.2 Environmental Effects**

This section assesses the potential noise and public health and safety effects associated with the Entiat 115 kV Transmission Program. The following discussion is divided into three parts that describe the evaluation criteria used in this analysis and discuss the effects of Alternative 1 – Proposed Action and Alternative 2 – No Action, respectively. The cumulative effects of the proposed alternatives are evaluated in Section 3.10.2.4. Direct, indirect, and cumulative effects are defined in Section 3.1 of this document.

### **3.10.2.1 Evaluation Criteria**

Washington noise regulations (WAC 173-60) are used as criteria to assess the effects of the proposed action alternative on noise. The WAC specifies noise limits according to the type of property where the noise would be heard (receiving property), as well as the land use of the noise source. Transmission lines are classified as industrial sources and daytime noise limits are 60 dBA in residential neighborhoods, 65 dBA in commercial areas, and 70 dBA in industrial areas. At night (10 p.m. to 7 a.m.), maximum permissible noise levels decrease by 10 dBA. Accordingly, a noise effect would be considered significant if sustained noise levels from transmission line alternatives exceed these existing state standards. Exemptions from daytime

(7 a.m. to 10 p.m.) restrictions include sounds generating from temporary construction and the installation and repair of essential services (e.g., power; WAC 173-60-040). Noise generated from substations is exempt from the required nighttime noise level reduction (WAC 173-60-040).

The criterion used to determine the significance of other effects on public health and safety, including EMF and fire, is whether the risk would preclude the use of the ROW or nearby areas for pre-existing activities. If the proposed activities do not pose a new health or safety risk but only alter or do not produce changes in activities on or near the ROW, the effect is not considered significant.

### 3.10.2.2 Alternative 1 – Proposed Action

#### Noise

##### *Impacts During Construction*

Potential noise impacts associated with Alternative 1 may occur during construction or ongoing operation and maintenance activities. Construction-related activities that generate noise include construction of temporary access trails, structural foundations, and installation of new structures. The loudest noise is expected to be associated with site preparation and excavation for structure installation.

Alternative 1 would require the installation of approximately 29 new transmission structures, a new switchyard, and a new substation. There would also be clearing associated with about 0.9 mile of temporary access trail that would be required, and three temporary laydown areas that would be used to store equipment and materials during construction. Limited clearing would also be required along sections of the proposed ROW on NFS lands (see Section 2.4.1). BPA (2003a) estimated that overall noise produced by construction equipment (e.g., grader, bulldozer, truck) was approximately 89 dBA at a distance of 50 feet (Table 3.10-2), with construction noise decreasing by 6 dBA for each doubling of distance from the source.

Noise impacts associated with construction during this project would be temporary. The duration of construction noise at a given locale would be limited, because the activities would be generally confined to proposed structure sites and would proceed sequentially from site to site.

A limited number of structures (approximately nine) would be delivered and set by helicopter. A helicopter flight plan designed to minimize the level of associated noise disturbance to nearby residences would be developed as part of the detailed engineering plans. Helicopter noise-related impacts would be localized and short term in nature.

**Table 3.10-2. Construction Noise in the Vicinity of a Construction Site**

<b>Distance from Construction Site (feet)</b>	<b>Hourly Median Noise (dBA)</b>
50	89
100	83
200	77
400	71
800	65
1,600	59
Notes: The following assumptions were used: (1) Equipment used included 1 each of grader, bulldozer, heavy truck, backhoe, pneumatic tools, concrete pump, crane. (2) Reference level noise: 89 dBA ( $L_{eq}$ ). (3) Distance for the reference noise level: 50 feet. (4) Noise attenuation rate: 6 dBA/doubling of distance; this calculation does not include effects of local shielding or atmospheric attenuation. Source: BPA 2003b.	

### ***Impacts During Operation and Maintenance***

Audible noise produced by substation equipment (not the connecting transmission lines) is generally associated with transformers in a substation. The proposed substation would include industry-compliant 115 kV transformers that would transmit about 50 to 55 dBA to a point 100 feet from the transformer (Corps 1995). This noise level is below the WAC daytime noise limits of 60 dBA in residential areas. The closest residence to the proposed substation site is located approximately 400 feet southeast across Entiat River Road.

The proposed switchyard would include less equipment than the proposed substation. Three circuit breakers would be installed along with required disconnect switches, support structures and electrical bus. In addition to the equipment a control building would be built to house the relay panels and required appurtenances to operate the switchyard system. Noise levels would be expected to be comparable or lower than those associated with a substation and below WAC daytime noise limits. Further, with respect to the comment raised during scoping, based on the distance of the proposed switchyard site from the closest residential properties to the south and the presence of Highway 97A, noise generated by the proposed switchyard is not expected to be noticeable to nearby residents. The north edge of the Shadow Ridge housing development is more than 500 feet from the proposed switchyard site and separated from the site by intervening vegetation and an earthen berm. A map showing the location of this development in relation to the Proposed Action is included in Appendix A to this document.

Annual visual inspections of the new transmission line would be conducted via helicopter. It is anticipated that the newly installed structures and conductors would not need replacement or major repairs, assuming predicted growth rates and barring natural disasters, including wildfire and ice storms, for 40 to 50 years.

### **Electric and Magnetic Fields**

Electric fields from the proposed 115 kV line would be much lower than those produced by the existing 345 kV or 500 kV lines. Magnetic fields from transmission lines can induce currents and voltages on long conducting objects parallel to the lines, which can interfere with electrical devices and also serve as a source for nuisance shocks. However, the effects are well understood and can be mitigated by grounding and other measures. For a 115 kV line, the distance where interference could occur under worst-case conditions would be approximately 40 feet from the centerline (BPA 2003a). Because the proposed ROW edge would be 70 feet from the centerline, and no incompatible development would be permitted for safety reasons within the ROW, these effects are expected to be negligible. The proposed transmission line would cross private property in the Crum Canyon area and pass approximately 200 feet north of the closest private residence.

The issue of whether there are long-term health effects associated with exposure to EMF from transmission lines is controversial. Over the last 20 years, extensive research has been conducted in the United States and around the world to examine whether the exposure to EMF at 50 to 60 hertz (Hz) has health or environmental effects. Scientific reviews of this research have found insufficient evidence to conclude that EMF exposures lead to long-term health effects, such as adult cancer, adverse effects on reproduction, pregnancy, growth and development of the embryo, or childhood leukemia (NIEHS 2002).

Magnetic fields from the proposed 115 kV line would also be much lower than those produced by the existing 345 kV or 500 kV lines. According to previous studies (BPA 1994 as presented in NIEHS 2002), typical magnetic fields from a 115 kV line average around 6.5 mG at 50 feet, decreasing to about 1.7 mG and 0.4 mG at 100 feet and 200 feet, respectively. Studies of the Public Utility District No. 1 of Okanogan County's existing Brewster 115 kV electric transmission line, which has a similar load and configuration to the proposed transmission line, found that magnetic fields were at background levels at a

distance of 25 feet from the line (Duke Engineering 1999). The transmission line ROW would be 70 feet on either side of the new line and along the existing ROWs.

## **Fire**

Construction of the proposed transmission line and associated facilities would occur during the spring, summer, and fall months. During this time, the weather will likely be hot and dry, with increasing danger of fire. Potential sources of fire associated with the construction and operation of the proposed transmission line include the use of vehicles and other motorized equipment (off-highway vehicles), transmission line failure, and vegetation in the ROW. These impacts would be primarily related to vegetation conditions within and adjacent to transmission line ROWs. Conditions that are conducive to wildfire include seasonally dry vegetation and overgrown vegetation along the ROW.

Fires on or near the ROW can jeopardize safe and reliable operation of transmission lines. Threats include physical damage from heat and flames, as well as arcing between lines, between lines and a transmission structure, or between lines and the ground caused by smoke and hot gases. The District would require all contractors to carry fire suppression tools (shovel, axe, and fire extinguisher) and be trained in fire suppression techniques to minimize the potential impact of starting a wildfire with transmission line construction activities. The District would coordinate with the affected land management agencies to restrict construction activities to periods of minimal fire hazard, and would obey Wenatchee National Forest and other land closures to construction activities during extreme fire danger periods.

Under Alternative 1 – Proposed Action, the ROW is designed to be wide enough to allow the transmission line to swing in high winds without touching existing vegetation or other structures, thereby eliminating the risk of fire. The District would establish and maintain safe clearances between the tops of trees and the proposed transmission line. Trees within or adjacent to the ROW that could cause electricity to arc from the transmission line or pose a hazard if they fall and come in contact with the line would be felled or topped to create snags. This is discussed further in Section 3.4.1.

Concern was expressed during public scoping for this project that falling rocks in the vicinity of the proposed switchyard could hit the switchyard and spark a wildfire. The potential for this to occur is believed to be low. The proposed switchyard would be situated approximately 100 feet south of the base of the steep, rocky slopes of Ribbon Cliff. The site was inspected by District and contractor transmission line engineering staff during initial site evaluations and as part of ongoing design work. No evidence of material from the cliff that would be likely to cause significant damage was observed on or in the immediate vicinity of the proposed switchyard site. To reduce the potential risk of project-related land and rock slides, structures located on the steep, rocky terrain would be delivered by helicopter and installed by hand crews. Rock barriers would be placed at the foot of the slope to buffer and protect the switchyard and equipment from falling rocks.

### **3.10.2.3 Alternative 2 – No Action**

There would be no action under Alternative 2 and no impacts to noise, public health, and safety. The existing conditions described in the Affected Environment part of this section, including those associated with BPA's operation and maintenance of the existing BPA transmission lines, would continue unaffected.

### **3.10.2.4 Cumulative Effects**

This section considers the incremental effects of the proposed alternatives when added to other past, present, and reasonably foreseeable future actions. Past and present actions affecting resources are included in the affected environment portion of this section. This includes the operation and ongoing maintenance of the existing BPA transmission lines and, as a result, the direct and indirect effects analysis

assesses the potential impacts of the Proposed Action in conjunction with these existing lines. Reasonably foreseeable future actions are defined for the purposes of this analysis as future actions that are planned within or in the immediate vicinity of the project area (defined for this analysis as the area within one mile of the Proposed Action). Projects are considered reasonably foreseeable in time if a plan or permit application has been filed with the county (for private lands) or they are identified as proposed or in progress by the responsible land management agency (for public lands).

The reasonably foreseeable actions included in this analysis are discussed in Section 3.1. These actions include the Crum Canyon Interface Fire Hazard Reduction project, the ongoing Shadow Ridge housing development located south of the proposed switchyard site, and planning permit applications for modifications to or construction of single-family residences within one mile of the Proposed Action.

The proposed Crum Canyon Interface Fire Hazard Reduction, which is designed to reduce the hazard of severe wildfire, would be completed at least a year before construction of the proposed transmission line, and is, therefore, not expected to result in cumulative noise or fire impacts. Residential construction activities in the Shadow Ridge housing development and at other sites within 1 mile of the Proposed Action could coincide in time with this project, but given the distance of these activities from the Proposed Action and the temporary duration of these construction activities, these activities are not expected to result in cumulative noise impacts. Further, it is assumed that all reasonably foreseeable residential construction projects will require approval by the Chelan County Planning Department and will be required to meet all applicable regulations and ordinances, including those designed to minimize noise impacts. Overall, considered together with these past, present, and reasonably foreseeable future actions the cumulative effect of the Proposed Action on noise and fire is expected to be low.

There are no other new electric transmission lines planned for the area and, as a result, the proposed project is not expected to result in cumulative EMF impacts beyond those associated with the existing BPA transmission line corridor, which are discussed in the direct and indirect effects section for Alternative 1 (Section 3.10.2.2).

## 3.11 OTHER ENVIRONMENTAL CONSIDERATIONS

The following discussion is divided into 11 sections that address the items identified in 40 Code of Federal Regulations (CFR) 1502.16 and the executive orders that address wetlands and floodplains and environmental justice, as well as effects on civil rights. In many cases, as noted below, these items are addressed in the preceding sections.

### 3.11.1 Irreversible and Irretrievable Commitments of Resources

*Irreversible* commitments of resources result from management decisions that affect nonrenewable resources such as soils, wetlands, and heritage sites. Such commitments are considered irreversible when the affected resource deteriorates to the point that renewal can only occur over a long period of time or at great expense, or because the resource has been destroyed or removed.

An *irretrievable* commitment of results is when a loss of production or use of resources occurs as a result of management decisions. Opportunities are foregone for the period of time that the resource cannot be used.

The effects of the proposed alternatives on natural resources are discussed in detail in the preceding sections of this chapter. These analyses did not identify any irreversible commitments of resources. The action alternative would involve ground disturbance associated with transmission structure installation, road improvements, construction laydown areas, a new switchyard site, and a new substation site. This disturbance would affect nonrenewable resources to varying degrees depending on the resource, as discussed in the preceding sections, but the effects are not expected to be *irreversible*. Although there would be localized disturbance in these areas, this is not expected to result in the overall deterioration, destruction, or removal of any nonrenewable resource in the project area.

The use of land for construction and operation of the proposed facilities would represent an *irretrievable* commitment in the areas where the structures are placed and at the new switchyard and substation sites, because these areas would no longer be available for some other use. This is not expected to be a substantial or permanent loss.

### 3.11.2 Unavoidable Adverse Environmental Effects

All probable adverse environmental effects are described earlier in this chapter. No significant effects were identified.

### 3.11.3 Short-Term Use versus Long-Term Productivity

The action alternative involves improvements to the existing electrical system in the Entiat Valley. These improvements are expected to serve the valley for the foreseeable future and may be considered a long-term use of the land. There would be no tradeoff of long-term productivity at the expense of short-term use.

### 3.11.4 Effects on Prime Farmland, Rangeland, and Forest Land

All alternatives are consistent with the intent of the Secretary of Agriculture Memorandum 1827 for prime land. Prime farmlands are defined as those lands that have the best physical and chemical characteristics for producing items such as food, feed, forage, fiber, and oilseed crops, which have not already been targeted for urban development or water storage (CFR 730-733 section 657.5). The Natural Resource Conservation Service (NRCS) identifies soil mapping units within Washington State that qualify as prime farmland based on specific soil criteria. Soil mapping units may be classified as prime farmland under current conditions or as prime farmland given that certain qualifying conditions exist on the site (e.g., “prime farmland when irrigated,” “prime farmland when protected from flooding,” etc.). In

such cases, if the qualifying conditions do not exist, then the unit is not considered to be “prime.” The proposed project would have an impact on approximately 1.49 acres of “prime farmland when irrigated,” and 0.07 acre of “farmland of statewide importance”. The “irrigated” prime farmland occurs on the proposed substation site. The other “prime farmland” would be affected by structure and temporary trail construction.

The NRCS does not assign a specific prime forestland status to soil types but defines prime forestland as land capable of growing wood at the rate of 85 cubic feet per acre per year at culmination of mean annual increment. The proposed project would not have an impact on prime forestland.

Prime rangeland is rangeland that, because of its soil, climate, topography, vegetation, and location, has the highest quality or value for grazing animals. The potential natural vegetation is palatable, nutritious, and available to the kinds of herbivores common to the area. The prime rangeland designation is based on criteria outlined in the USDA Statement of Land Use Policy (DR 9500-3, March 22, 1983). There is no prime rangeland within the project area.

### **3.11.5 Urban Quality and Historic and Heritage Resources**

The direct, indirect, and cumulative effects of the alternatives on historic and heritage resources are discussed in Section 3.8, Cultural Resources. Effects on land use are discussed in Section 3.6. None of the communities in the project area met the Census Bureau’s definition of urban in 2000. The census defines an urban area as a village, town, city, or census designated place with population greater of 2,500 or more persons.

### **3.11.6 Energy Requirements and Conservation Potential of Alternatives**

The overall purpose of the Entiat 115 kV Transmission Program is to resolve existing capacity deficiencies in the electrical service in the Entiat Valley area and improve the reliability of this service.

### **3.11.7 Potential Conflicts with Plans and Policies of Other Jurisdictions**

Existing land use plans and policies are discussed in Section 3.6, Land Use and Recreation. Utility facilities are conditional uses in all land use zones crossed by the proposed alternatives. The proposed action is consistent with the Wenatchee National Forest Land and Resource Management Plan (Wenatchee Forest Plan) and the BLM Spokane Resource Management Plan and Amendments.

### **3.11.8 Wetlands and Floodplains**

Activities on Federally-owned land follow Executive Order 11990 that requires Federal agencies “to avoid ... adverse impacts associated with the destruction or modification of wetlands ... wherever there is a practicable alternative.” This order establishes a sequencing policy of avoidance, minimization, and possible mitigation. Federally owned lands also fall under the jurisdiction of the policies of the Federal agency that manages the land. Actions on National Forest System lands are currently governed by the Wenatchee Forest Plan (USDA Forest Service 1990) as amended by PACFISH (1995). The potential effects of the action alternative on wetlands and riparian vegetation are discussed in Section 3.4, Vegetation. As noted in Section 3.4, no wetlands would be affected by the proposed action.

The proposed substation is located approximately 200 feet from the Entiat River. Construction and operation of this substation would require improvements to an existing access road that is within 200 feet of the river. A Conditional Use Permit would be required from Chelan County to construct the substation and improve the existing road in this location. A shoreline exemption would be required for the road improvements within 200 feet of the river. The proposed action alternative is not expected to have significant floodplain impacts.

### **3.11.9 Consumers, Civil Rights, Minority Groups, Low-Income Populations, and Women**

Civil rights would not be affected by either of the alternatives. The project includes work accomplished by the Public Utility District No. 1 of Chelan County (District) and the USDA Forest Service, as well as contracted work. Under Executive Order 11246, companies with Federal contracts or subcontracts are prohibited from job discrimination on the basis of race, color, religion, sex or national origin. The USDA prohibits discrimination in its employment practices based on race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital and family status. The District is also committed to ensuring equal employment opportunity and nondiscrimination and treats individuals in accordance with all applicable local, state, and federal laws regarding age, sex, marital status, sexual orientation, race, creed, color, national origin, and disability.

Executive Order 12898 (59 Fed. Reg. 7629, 1994), Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs Federal agencies to identify and address, as appropriate, any disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. Environmental justice is discussed in Section 3.9.2.5.

### **3.11.10 Federal, State, and Local Laws**

All of the alternatives are consistent with Federal, state, and local laws.

### **3.11.11 Public Health and Safety**

No public health or safety problems are anticipated under any of the proposed alternatives. Public health and safety is discussed in Section 3.10.

### **3.11.12 Wild and Scenic Rivers**

Although the upper Entiat River is recommended for designation as a scenic river under the Wild and Scenic River system in the Wenatchee Forest Plan (USDA Forest Service 1990), the lower Entiat River in the vicinity of the project area for this project is on private lands and the Wenatchee Forest Plan made no recommendations for those lands.

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## 5. LIST OF PREPARERS AND AGENCIES/PERSONS CONSULTED

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**Table 5-5.** WDNR Team Members

Name	Responsibility
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**Table 5-6. Tetra Tech EC Team Members**

<b>Name</b>	<b>Responsibility</b>
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Judy Brown	Word Processing

## **5.2 AGENCIES/PERSONS CONSULTED**

This section identifies the agencies and persons that were consulted as part of the environmental assessment prepared for the Entiat 115 kV Transmission Program.

### **Federal and State Agencies Consulted**

USDI Bureau of Land Management  
USDI Fish and Wildlife Service  
National Oceanic and Atmospheric Administration (NOAA) Fisheries  
Washington Department of Archaeology and Historic Preservation  
Washington Department of Ecology  
Washington Department of Fish and Wildlife  
Washington Department of Natural Resources  
Washington Department of Transportation

### **Other Governing Organizations Consulted**

Confederated Tribes of the Colville Reservation  
Yakama Nation  
Chelan County Community Development (Planning, Building, and Fire Safety)  
Chelan County Public Works  
City of Entiat Public Works Department

### **Members of Public and/or Interested Groups Providing Input**

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Ken Cain  
Dennis Chambers, Entiat School District  
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## 6. DISTRIBUTION LIST

The following organizations and individuals were sent a copy of this Environmental Assessment.

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Entiat School District, Dennis Chambers	Entiat, WA
Entiat Public Library	Entiat, WA
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Washington Department of Fish and Wildlife, Chris Parsons	Ephrata, WA
Washington Department of Natural Resources, Matt Fromherz	Ellensburg, WA

## 7. GLOSSARY

**Area of potential effect (APE)** — The geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties.

**Bedrock** — Solid rock beneath the soil and superficial rock.

**Best Management Practices (BMPs)** — A practice or combination of practices that are the most effective and practical means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

**Bull trout** — Members of the char subgroup of the salmon family (salmonids), which also include the Dolly Varden, lake trout, and Arctic char.

**Capacity** — The maximum load that a generator, piece of equipment, substation, transmission line, or system can carry under existing service conditions.

**Carbon monoxide (CO)** — An odorless and colorless gas formed from one atom of carbon and one atom of oxygen.

**Census County Division (CCD)** — A subdivision of a county that is a relatively permanent statistical area established cooperatively by the Census Bureau and state and local government authorities.

**Census tract** — A subdivision of a county smaller than a CCD that often follows visible features, but may also follow governmental boundaries and other non-visible features; homogenous with respect to population characteristics, economic status, and living conditions.

**Clean Water Act 303(d) list** — List of waterbodies that do not meet water quality standards.

**Conductor** — The wire cable strung between transmission towers through which electric current flows.

**Corona** — Corona occurs in regions of high electric field strength on conductors, insulators, and hardware when sufficient energy is imparted to charged particles to cause ionization (molecular breakdown) of the air.

**Cumulative effect** — Cumulative effects are created by the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions.

**Current** — The amount of electrical charge flowing through a conductor (as compared to voltage, which is the force that drives the electrical charge).

**dBA** — The first two letters (dB) are an abbreviation for decibel, the unit in which sound is most commonly measured (see decibel). The last letter (A) is an abbreviation for the scale (A-scale) on which the sound measurements were made.

**Dead-end structures** — Heavy towers designed for use where the transmission line loads the tower primarily in tension rather than compression, such as in turning large angles along a line or bringing a line into a substation.

**Debris flow** — Rapid movement of water-charged mixtures of soil, rock, and organic debris down steep stream channels.

**Decibel** — A decibel is a unit for expressing relative difference in power, usually between acoustic signals, equal to 10 times the common logarithm of the ratio of two levels.

**Diameter at breast height (dbh)** — The diameter of a tree at breast height off the ground.

**Distinct population segment** — A population that is distinct and geographically isolated from others with no genetic interchange between them due to natural and man-made barriers.

**Distribution line** — The structures, insulators, conductors, and other equipment used to deliver electricity directly to the customer.

**Distribution underbuild** — Using transmission poles to also carry distribution conductors from existing system taps by situating the distribution lines on cross-arms below the transmission lines.

**Easement** — A grant of certain rights to the use of a piece of land (which then becomes a “right-of-way”). This includes the right to enter the right-of-way to build, maintain, and repair the facilities. Permission for these activities is included in the negotiation process for acquiring easements over private land.

**Electric and magnetic fields (EMF)** — The two kinds of fields produced around the electric wire or conductor when an electric transmission line or any electric wiring is in operation.

**Endangered species** — Those species officially designated by NOAA Fisheries and the U.S. Fish and Wildlife Service that are in danger of extinction throughout all or a significant portion of their range.

**Endangered Species Act (ESA)** — A 1973 Federal law, amended in 1978 and 1982, to protect troubled species from extinction. NOAA Fisheries and the U.S. Fish and Wildlife Service decide whether to list species as Threatened or Endangered. Under the Act, Federal agencies must avoid jeopardy to and aid the recovery of listed species.

**Essential Fish Habitat (EFH)** — Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (Magnuson Fishery Conservation and Management Act).

**Exceedence levels (L levels)** — The A-weighted sound level that is exceeded for a specified percentage of the time.

**Experiential impact** — Impact that could negatively affect the experience of using or viewing an area.

**Federally listed** — Species listed as **Threatened** or **Endangered** by the U.S. Fish and Wildlife Service.

**Floodplain** — That portion of a river valley adjacent to the stream channel which is covered with water when the stream overflows its banks during flood stage.

**Forb** — Any herbaceous plant that is not a grass or not grasslike.

**Functional impact** — Impact that could preclude the use of or access to an area or an activity.

**Gauss** — A unit of magnetic induction.

**Geographic information system (GIS)** — A computer system that analyzes graphical map data.

**Habitat types** — Lands capable of producing similar plant communities at climax.

**Hertz (Hz)** — The unit of frequency in cycles per second; power systems in the U.S. operate with a frequency of 60 Hz.

**“Hot” rebuild** — Replacing an existing transmission or distribution line while maintaining power in the existing lines.

**Hydrology** — The science dealing with the properties, distribution, and circulation of water.

**Insulators** — A ceramic or other nonconducting material used to keep electrical circuits from jumping over to ground.

**Intermittent** — Referring to periodic water flow in creeks or streams.

**Invertebrates** — Any animal without a backbone or spinal cord; any animal other than a fish, amphibian, reptile, bird, or mammal.

**Kilovolt** — One thousand volts. (See **Volt**.)

**Landslide** — Any mass-movement process characterized by downslide transport of soil and rock, under gravitational stress, by sliding over a discrete failure surface; or the resultant landform. Can also include other forms of mass wasting not involving sliding (rockfall, etc.).

**Large woody debris (LWD)** — Any piece of downed wood larger than 4 inches in diameter and 6 feet long.

**Late successional (or late seral)** — A forest in which the trees are even older and larger than a mature forest, the canopy is more open, some larger trees have died and become snags, and there is a well-developed understory of large trees; stands are typically between 120 and 190 years old.

**Load** — The amount of electric power or energy delivered or required at any specified point or points on a system. Load originates primarily at the energy-consuming equipment of customers.

**Management Indicator Species (MIS)** — Species that indicate when an environmental problem is present in a particular habitat.

**Milligauss (mG)** — A unit used to measure magnetic field strength; one-thousandth of a gauss.

**Mitigation** — Steps taken to lessen the effects predicted for each resource, as potentially caused by the proposed project. They may include reducing the impact, avoiding it completely, or compensating for the impact. Some mitigation, such as adjusting the location of a structure to avoid a special resource, is taken during the design and location process. Other mitigation, such as reseeding access roads and avoiding weed proliferation, is taken after construction.

**Nitrogen oxides** — A group of compounds consisting of various combinations of nitrogen and oxygen atoms.

**NOAA Fisheries** — The Federal agency that oversees threatened and endangered anadromous fish species.

**Non-attainment area** — An area that does not meet air quality standards set by the Clean Air Act for specified localities and periods.

**Noxious weeds** — A noxious weed species is defined in Washington State as “a plant that when established is highly destructive, competitive, or difficult to control by cultural or chemical practices” (Revised Code of Washington [RCW] 17.10.010).

**Old growth** — A forest typically at least 200 years of age with moderate to low canopy closure; a multi-layered, multi-species canopy dominated by large overstory trees; numerous large snags; heavy accumulations of fallen wood; smaller trees in various age classes, as well as shrubs and herbaceous vegetation in the understory and on the forest floor.

**Outage** — Events caused by a disturbance on the electrical system that requires the provider to remove a piece of equipment or a portion or all of a line from service. The disturbances can be either natural or human-caused.

**Ozone** — Associated with the corona discharge of high-voltage transmission lines. Rapidly recombines back to O<sub>2</sub>.

**Perennial streams or creeks** — Those with year-round water flow.

**Recreation Opportunity Spectrum** — USDA Forest Service classification system uses a scale ranging from primitive to urban for the purpose of planning and managing recreational resources.

**Revegetate** — Re-establishing vegetation on a disturbed site.

**Right-of-way (ROW)** — An easement for a certain purpose over the land of another, such as a strip of land used for a road, electric transmission line, pipeline, etc.

**Riparian habitat** — The zone of vegetation that extends from the water’s edge landward to the edge of the vegetative canopy. Associated with watercourses such as streams, rivers, springs, ponds, lakes, or tidewater.

**Riparian Habitat Conservation Areas (RHCA)** — Portions of watersheds that are set aside under PACFISH (1995) where riparian-dependent resources receive primary emphasis to enhance management of aquatic systems.

**Scoping** — Part of the environmental assessment process under NEPA whereby potential issues are identified for detailed analysis.

**Sedimentation** — The deposition or accumulation of sediment.

**Sensitive species** — Those plants and animals identified by the Regional Forester for which population viability is a concern as evidenced by significant current or predicted downward trend in populations or density and significant or predicted downward trend in habitat capability.

**Seral** — Pertaining to the stages of ecological succession occurring in communities of plants and animals until the climax is reached.

**Shrub-Steppe** — A steppe is a native vegetation type dominated by grasses. A shrub-steppe is a grassland with a component of shrubs, generally species of sagebrush (*Artemisia*).

**Snag** — A dead or dying tree.

**Species** — A group of interbreeding individuals not interbreeding with another such group; similar, and related species are grouped into a genus.

**Structures** — Refers to a type of support used to hold up transmission or substation equipment.

**Substation** — The fenced site that contains the terminal switching and transformation equipment needed at the end of a transmission line.

**Switches** — Devices used to mechanically disconnect or isolate equipment; found on both sides of circuit breakers.

**Talus** — Rock debris that has accumulated at the base of a cliff or steep slope.

**Temporary Access Trail** — Unimproved dirt roads without surfacing or regular maintenance that would average 18 feet in width.

**Threatened species** — Those species officially designated by NOAA Fisheries and the U.S. Fish and Wildlife Service that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

**Trail** — see **Temporary Access Trail**

**Transformers** — Electrical equipment usually contained in a substation that is needed to change voltage on a transmission system.

**Transmission line** — The structures, insulators, conductors, and other equipment used to transmit electrical power at high voltage to electric distribution facilities (substation).

**U.S. Fish and Wildlife Service (USFWS)** — The Federal agency that is charged with the protection of threatened and endangered plants and animals.

**Visual assessment point (VAP)** — Specific locations where the proposed transmission facilities would be visible.

**Visual quality objective (VQO)** — Management standards that identify five degrees of alteration to the natural landscape based on the landscape's diversity of natural features and the public's concern for scenic quality.

**Volt** — The international system unit of electric potential and electromotive force.

**Voltage** — The driving force that causes a current to flow in an electrical circuit.

**Watershed** — The area that drains to a common waterway.

**Wetlands** — An area where the soil experiences anaerobic conditions because of inundation of water during the growing season. Indicators of a wetland include types of plants, soil characteristics, and hydrology of the area.

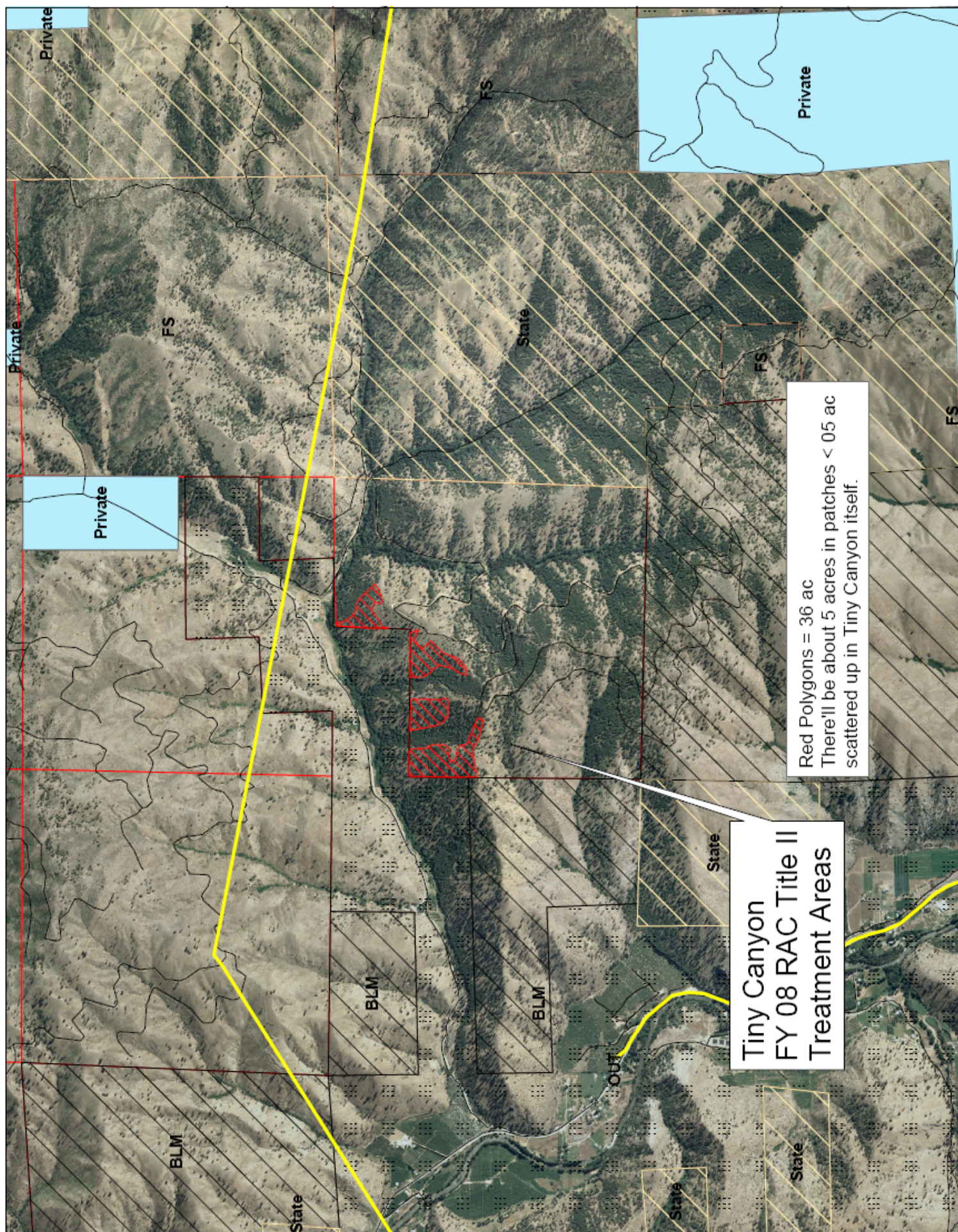
**Zoning** — Regulations used to guide growth and development; typically involve legally adopted restrictions on uses and building sites in specific geographic areas to regulate private land use.

## **APPENDIX A**

### **REASONABLY FORESEEABLE ACTIVITIES WITHIN THE PROJECT VICINITY**

Crum Canyon Interface Fire Hazard Reduction Project Location

Shadow Ridge Residential Development Location



Red Polygons = 36 ac  
There'll be about 5 acres in patches < 0.5 ac  
scattered up in Tiny Canyon itself.

Tiny Canyon  
FY 08 RAC Title II  
Treatment Areas

PROPOSED SWITCHYARD SITE

SHADOW RIDGE



## **APPENDIX B**

### **SUMMARY OF WENATCHEE NATIONAL FOREST MANAGEMENT INDICATOR SPECIES AND HABITAT ASSOCIATIONS**

## Appendix B

### Summary of Wenatchee National Forest Management Indicator Species and Habitat Associations

Species	Viability <sup>1/</sup>	Habitat Capacity <sup>2/</sup>	Forest Type and Seral Stage <sup>3/</sup>						Unique Habitats								Conservation Measures <sup>4/</sup>							
			Dry			Mesic			Subalpine Fir			Hardwoods	Riparian/Wetland	Talus/Scree	Cliff/Caves	Meadow/Shrubs	Edge	Snags	Logs	NWFP - Aquatic Conservation Strategy	NWFP - Late Successional Reserve	NWFP, FP - Snag/Downed Log Guidelines	FP - winter Range Standards and Guidelines	
			Opening	Low Density	Succession Adv.	Opening	Single Layer	Succession Adv.	Opening	Single Layer	Succession Adv.													
ruffed grouse			BF	BF	BF	X	X	X	F	F	F	BF	BF				BF	BF		X				
three-toed woodpecker	3									BF	BF						BF	F				X		
pileated woodpecker	4			BF	BF		X	X									BF	BF	F		X	X		
mule deer		Decline	BF	BF	BF	X	X	X	BF	BF	BF	BF	F		F	X	BF	BF						X
Lewis's woodpecker	4		BF	BF	BF	X	X	X				X	BF			BF	BF	X	F			X		
red-breasted sapsucker	3		X	X	X	X	X	X				X	X			X			X				X	
Williamson's sapsucker	3											BF	BF					BF	F				X	
downy woodpecker	3															X	BF	BF	F			X		
hairy woodpecker	2			BF	BF		X	X		BF	BF						X	BF	F					
white-headed woodpecker	4			X	X												X	X	X			X		
black-backed woodpecker	3						X	X		BF	BF						BF	BF	F			X		
northern flicker			BF	BF	BF	X	X	X				BF	BF				F	BF	F				X	

Sources: Lehmkuhl et al. (1997, 2001), Wisdom et al. (2000)

<sup>1/</sup> Viability: 1 = Habitat is broadly distributed with little or no limits to population interactions.

2 = Habitat is broadly distributed but some gaps exist. Disjunct patches generally allow species to interact as a metapopulation.

3 = Habitat exists primarily as patches; some populations are isolated.

4 = Habitat exists as isolated patches with limited opportunity for population interactions. Local populations may be extirpated.

5 = Habitat is very scarce with little or no possibility for interactions of populations. Strong potential for extirpations.

<sup>2/</sup> Habitat Capability: shows the trends in habitat capability based on Lehmkuhl et al. (2001) and Wisdom et al. (2000).

<sup>3/</sup> B = Habitat used by this species for breeding; F = Habitat used by this species for foraging; X = Habitat used by this species but no specific behavior was documented.

<sup>4/</sup> NWFP = Northwest Forest Plan; FP = Wenatchee Forest Plan

# Entiat Valley 115 kV Transmission Program



USDA Forest Service  
Okanogan and Wenatchee  
National Forests



USDI Bureau of Land Management  
Spokane District



**POWER**

Public Utility District No. 1  
of Chelan County